Santa Clara Valley
Water District

Current Version
Revision 8-14-02: Update BMPs ~~to May 17, 2002~~

Appendices for the Final Permit Package for the Multi-Year Stream Maintenance Program

February 2002

Santa Clara Valley Water District

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APPENDIX A:

BANK PROTECTION

San Francisco Regional Water Quality Control Board
Tentative Order
Appendix A

Santa Clara Valley Water District

Stream Maintenance Program Programmatic Impact Assessment and Mitigation for Routine Bank Protection Activities

December 2001

1.0 OVERVIEW

Bank protection involves any action by the District to repair stream banks that are eroding as well as to prevent bank erosion. The District may implement stream bank repair when the continuing stream degradation: (1) causes or could cause significant damage to a property or adjacent property, (2) is a public safety concern, (3) adversely affects transportation or recreational use, (4) adversely impacts beneficial uses of surface water, or (5) adversely affects riparian habitat. Bank protection also includes preventive maintenance to ensure that banks do not erode in the future. Such erosion protection reduces sedimentation and improves water quality.

The District uses a wide range of bank protection techniques. Repairs can take several forms, ranging from the use of soft structures (i.e., willow brush mattresses, log crib walls, pole plantings) to the installation of hard structures (i.e., rock blanket, concrete, sack concrete, gabions) or combination of hard and soft structures.

Riparian corridors in Santa Clara County provide a remarkable range of biological functions. These functions range from fish and other aquatic habitat in the streams themselves to foraging and nesting habitat for birds in the woodland canopy above to movement corridors for numerous terrestrial species. Bank protection activities may alter the biological resource values of the stream environment by changing the conditions in the stream itself or by changing the vegetation surrounding the stream.

The Stream Maintenance Program (SMP) provides for routine bank protection activities throughout the District's jurisdiction. The SMP incorporates a programmatic impact assessment and mitigation for routine bank protection activities that is intended to meet the majority of concerns for the function of aquatic and riparian habitats in the streams. This programmatic assessment will be supplemented by other DEIR sections that describe specific potential impacts to water quality, listed species, etc., from bank protection and other SMP components and provide the numerous Best Management Practices (BMPs) that address those impacts.

2.0 BANK PROTECTION WORK

Based on 13-year historical records, the District estimates that an average of roughly one linear mile of stream banks may be repaired annually. Many repair sites are small and are not easily predicted. The quantity and location of bank protection activities varies greatly from year to year, based on watershed conditions (heavy rains often lead to more work in the following year), degree of safety hazard, work load, budget, and quantity of other priority work to be done in a given year. The description of historical bank protection in the SMP shows that a greater concentration of bank protection occurs in cities and semi-rural foothills of the Santa Clara Valley. Actual future bank protection work could potentially be done anywhere it is needed within District jurisdiction.

Many areas receiving bank protection are void of native riparian vegetation as a consequence of erosion. Nevertheless, over the 20-year life of this proposed program, some 20 miles of the approximately 1650 miles of bank under District jurisdiction can be expected to be modified, and some increment of existing riparian vegetation can be expected to be lost. Soft erosion control methods are not always adequate to protect life and property. Therefore, some portion of that 20 miles will be protected with hardscape methods, and riparian vegetation may be precluded from reestablishing. Under the Stream Maintenance Program, the District has committed to installing on an annual average basis no more than ½ mile of the bank protection work using impervious hardscape designs.

The general design criteria and cross-section for each of the bank protection methods used by the District are included in this appendix. In addition to those criteria, design of a particular bank protection project includes evaluation of other site specific characteristics, such as location (for example, the inside of or outside of a curve), soil type, shear stress, features of the channel adjacent to the site and available right of way. Figure E-1 is a flow diagram of the bank protection alternatives selection process.

3.0 CLASSIFICATION OF RESOURCES, TECHNIQUES, IMPACTS, AND REVEGETATION POTENTIAL

This section provides several simple classifications of the biological species, stream functions and bank protection techniques utilized as background information for the potential effects of bank protection projects and the mitigation ratios required by the agencies.. Conditions vary widely from stream to stream and even over short distances within a stream. The intent in these classifications is to represent the typical conditions.

3.1 Species

As described in the Environmental Setting section of the Draft Environmental Impact Report (DEIR), healthy riparian habitat is critical to maintaining biological diversity in areas such as Santa Clara County, where upland habitat has been intensively modified for agricultural and urban uses. Biological species potentially impacted include strictly aquatic species, such as fish, strictly terrestrial (upland) species, such as songbirds, and numerous species that move between the aquatic and adjacent upland habitat, such as frogs. Qualitatively, the aquatic species of greatest concern is the federally listed steelhead. Other aquatic species of concern include land-locked rainbow trout, chinook salmon, and other native fish. The terrestrial species of particular concern include birds, especially neotropical migrants and raptors. Impacts to the semi-aquatic reptiles and amphibians, such as California red-legged frogs and western pond turtles, are of potential concern in both aquatic and terrestrial habitat.

3.2 Stream Functions

Stream functions potentially affected by bank protection are classified as either in-stream functions primarily affecting the aquatic environment or stream side functions primarily affecting the riparian environment, but also affecting the aquatic environment. Note that other in-stream functions generally not impacted by bank protection, such as steelhead spawning habitat, are also addressed in the DEIR. For in-stream functions, conditions beneficial for native fish are of paramount importance. The following discussion oversimplifies the aquatic species habitat relationship, but is a reasonable guide to how stream functions would typically be affected .

3.2.1 In-stream

In-stream functions provided in or immediately adjacent to the normal flow channel directly serve aquatic and semi-aquatic species. For the purposes of this description, , the in-stream channel is defined to be the area below Ordinary High Water. Functions include:

1. In stream Escape Cover: provided by undercut banks, large boulders, tree roots, downed trees, and other structural elements (including deteriorating bank protection projects)
2. Hydraulic Complexity: resulting from the interaction of current with the same structural elements providing instream escape cover
3. Velocity Refuge: also provided by structural elements
4. Shading and water temperature moderation: provided by mature riparian shrubs and trees
5. Overhanging escape cover: provided by shrubs and grasses near the stream edge

3.2.2 Stream-side

The stream-side environment includes the functions of riparian vegetation. This upland vegetation benefits terrestrial species, as well as semi-aquatic amphibians and reptiles and fish. Functions include:

1. Sediment stabilization: provided by riparian trees, shrubs and grasses
2. Shading and water temperature moderation: provided by mature riparian shrubs and trees
3. Overhanging escape cover: provided by shrubs and grasses near the stream edge
4. Bird breeding and foraging habitat: provided by mature native riparian species, such as cottonwoods and willows, oaks, other trees, shrubs, forbs, grasses, and the streambank itself
5. Foraging, refugia, estivation, and breeding habitat for semi-aquatic amphibian and reptile species: provided by low vegetation, rocks, downed materials, and the streambanks itself
6. Foraging, breeding, hibernacula, and dispersal habitat for mammals: provided by the riparian vegetation and the streambanks, substrate

3.3 Bank Protection Techniques

This appendix includes the descriptions and drawings for approximately 30 methods of bank protection. Under the description for each bank protection method, a habitat impact assessment is provided for in-stream habitat and stream-side habitat. For each habitat type, there are three categories of effects: those that (1) enhance biotic resources, (2) provide limited biotic resource, or (3) reduce or eliminate biotic potential. This background information was used by the resource agencies to create mitigation ratios for each bank protection method as shown in the Bank Protection Methods table. The appendix will be updated as new methods or criteria are added to the program.

4.0 IMPACT AND MITIGATION

The District proposes to implement a bank protection program that avoids impacts to the greatest extent possible and incorporates mitigation to balance impacts that cannot be avoided. The impact of bank protection depends on the type of work done and subsequent mitigation as required by the resource agencies and shown in the Bank Protection Measures table

Neutral. A project effect is said to be neutral when the environmental effect of a bank protection measure results in neither an adverse impact nor a significant net benefit to the existing environment.

Impact. A project effect is said to be an impact when the environmental effect of a bank protection measure results in an adverse impact to the existing environment.

Benefit. A project effect is said to be a benefit when the environmental effect of a bank protection measure results in a significant net benefit to the existing environment.

Not Covered by the SMP. In some cases, the environment is judged to have a high environmental sensitivity and certain bank protection techniques would have a significant irreversible and cumulative effect that cannot be effectively mitigated by enhancing conditions elsewhere. Such projects are deemed to be outside of the scope of the routine maintenance in the SMP. Such excluded projects are bank protection methods 7, 8, 10, 10A, 11, 13, 13A and 14 in high sensitivity fisheries reaches (defined below), and methods 7, 7A, 8, 9, 9A, 9B, 10, 11, 11A, 13, 13A, and 14 in high quality riparian habitat areas (defined below). Also excluded is emergency work.

4.1 In-stream Impacts

In-stream environmental quality is primarily determined by fisheries present. Other mitigation is proposed elsewhere for impacts on other protected aquatic species such as red-legged frog. Most District streams have been categorized by fisheries present.

High Sensitivity Fisheries. Cold water fishery with trout or steelhead, warm water fishery with trout potential (DEIR fish habitat categories 5, 6, and 7).

Medium Sensitivity Fisheries. Warm water native fishery, salmon present (DEIR fish habitat categories 3 and 4) or any reach used for steelhead migration.

Low Sensitivity Fisheries. Warm water fishery, mostly introduced species, fish limited or no value (DEIR fish habitat categories 0,1 and 2), but only where the reach is not used for steelhead migration).

4.2 Stream-side Impacts

The impact of bank protection on stream-side functions can be evaluated based upon the quality of the riparian habitat impacted and the potential for the site to be revegetated, based on the bank protection work being done. Although the primary Work Measure is lineal extent of stream channel (lineal feet), riparian value will also need to take into account the area affected (square feet) and the number of stems for large vegetation. See BMP 2.8, Replace Trees.

4.2.1 Riparian Habitat Quality

The riparian quality can be classified as:

High Quality Riparian Habitat. Sites with native overstory with continuous understory or occurring in dense thickets; dense native overstory with sparse, non-native or no understory; and native willow thickets. Site may provide overhanging escape cover and shading.

Medium Quality Riparian Habitat. Sites with sparse native overstory with sparse, non-native or no understory; non-native overstory with native understory; and dense nonnative overstory with sparse, non-native or no understory. Site may provide some overhanging escape cover and shading.

Low Quality Riparian Habitat. Sites with no or only sparse non-native overstory with sparse, non-native, or no understory. Site may provide some overhanging escape cover for fish.

4.2.2 Riparian Restoration Potential

Ideally, all bank protection projects would be revegetated to restore full natural potential values, however, there are practical limitations. First, creeks are often in a highly disturbed state with much of the natural system already absent. Second, the need to stabilize over-steepened banks or to withstand very high water velocities may preclude reliance on revegetation alone for bank protection. Third, the banks may be so steep and incised that they do not provide space for riparian vegetation. Fourth, the engineered bank itself may involve impervious surface or such heavily compacted earth that some normal stream side vegetation cannot become established and thrive. Rather than specify impact according to the type of bank protection technique, stream-side impacts are characterized by the potential for restoration, taking in to account the technique and the site limitations.

High Riparian Restoration Potential. Sites where dense native overstory and dense native understory, including willow thickets where appropriate, can be readily established. Overhanging escape cover and shading can be incorporated.

Moderate Riparian Restoration Potential. Sites where sparse native overstory with moderate to dense native understory can be established. Overhanging escape cover and shading may potentially be incorporated.

Low Riparian Restoration Potential. Sites where no or only sparse native overstory and no or only sparse native understory can be established.

4.3 Mitigation for Bank Protection

The District will use the Bank Protection Measures table to indicate the mitigation ratio required by the resource agencies for any new bank protection projects. Certain methods as indicated in the table and any method that includes an area of on-site planting with appropriate native riparian vegetation equivalent to the area of hardscape added by the project will be considered self-mitigating and will not require additional offsite planting. For example, if method 2A, Live Construction with Boulder Toe, was installed and the toe consisted of an area of 100 square feet of vegetated boulders, a properly vegetated upper slope that equaled 100 square feet (ratio of 1:1) is considered adequate mitigation for the project. If the boulder toe was not vegetated, an area of 300 square feet (ratio of 3:1) would be necessary for mitigation, and this could either be planted onsite, offsite, or both. Surplus vegetated area beyond that needed to mitigate an individual site cannot be banked as mitigation credit for other bank protection sites.

This mitigation approach will account for all direct, potential and cumulative impacts from the bank protection program. All impacts and credits will be measured by area of hardscape and planting, respectively, and the ongoing totals will be reported in the annual report. Mitigation for both on-site and off-site revegetation will be consistent with the Protocol for Revegetation Associated with Bank Protection in this appendix. Typically, repair or replacement of existing bank protection projects will be undertaken with softer type approaches and will not require additional mitigation.

In addition to planting, other activities may be proposed as mitigation for bank protection activities. The following activities are guidelines for such alternative mitigation approaches:

- Replacement of an intact or failing impervious bank protection site with a permeable design that can be planted with appropriate native riparian vegetation
- Replacement of concrete rubble, tires, and other debris for stream bank erosion control, with an earth bank planted with appropriate native riparian vegetation
- Replacement of intact or failing gabions with an earth slope planted with appropriate native riparian vegetation
- Replacement of an unvegetated stream bank or bank composed of invasive plant species with appropriate native riparian vegetation
- Removal of an existing maintenance rods, access road, or trail, where the existing road or trail is regraded and planted with appropriate native riparian vegetation in such a way that will improve the stream channel cross-section, plan and profile
- Redesign or replacement of an intact bridge, culvert or drainage structure to improve geomorphic conditions such as bank erosion and channel bed incision
- Exclusion of cattle from riparian areas.

PROTOCOL FOR REVEGETATION ASSOCIATED WITH BANK PROTECTION

Introduction

The purpose of this document is to provide a protocol for developing the revegetation element used in bank protection.

This revegetation protocol contains the following components:

- Location of Plantings
- Plant Selection Criteria
- Planting Techniques
- Establishment Maintenance
- Monitoring/Reporting

This protocol provides the criteria and techniques used in the revegetation element of certain bank protection projects. The methods for revegetation are similar whether the material is being installed on site to reduce environmental impacts or is being installed off site as mitigation for impacts.

Location of Plantings

For overall watershed integrity, it is most desirable to plant at the site of the actual impacts.
The site will be evaluated, pre and post project, for ecological and horticultural viability to assure that it can successfully support riparian vegetation. Adjacent areas will be surveyed to determine what types of vegetation a particular creek supports and what limitations may exist for plant establishment.

Vegetation will be planted as near the low flow channel as possible to provide maximum environmental benefit. On repairs where vegetated rock or wood is designed at the toe of the slope, the vegetation will be planted just above the structure. Where design criteria permits, space is available and the hydrology is appropriate, cuttings or small container plantings will be installed into the structure.

For a site to be suitable, it must have ecological, hydraulic, and geomorphic characteristics that give a high degree of certainty for successful revegetation. Design elements that will allow planting will be incorporated into the bank repair if there are not engineering constraints.

In some instances, planting at the actual repair site may not be practical or sustainable. Those situations are referred to in portions of the bank stabilization section of this document. When an alternative site must be selected, it will be selected using the following criteria in descending order of desirability:

- Immediately upstream or downstream of the impact site.
- On the same creek as the impact site.
- In the same watershed as the impact site.
- In an adjacent watershed to the impact site.
- In another riparian area in the same part of the county.
- Within the county.

Once an appropriate location has been selected, all other planting guidelines will apply to the site.

Plant Selection Criteria

The criteria for plant selection will be developed based on surveys of natural areas on the same creek that have a similar ecological setting. These "reference sites" will provide information as to what species would be found in the area and an approximate population density. These areas may also provide propagation materials for the repair site. The stream reaches in valley floor of Santa Clara County have a fairly narrow palette of plant species but reference sites will allow further refinement of the project design to improve the potential for success.

If the District is unable to find appropriate reference sites on the same stream, other areas in the county that have similar ecological conditions will be used as a design reference.

Planting Techniques

Planting techniques for bank stabilization projects will use standard revegetation methods. The following general guidelines will be incorporated into these projects:

- Container stock, seed, or vegetative cuttings will be installed using hand tools or mechanical augers.
- Planting will be done using spacing and a species mix designed to mimic a natural system.
- Designs will incorporate both trees and shrubs to provide habitat complexity.
- While an area may be slightly over-planted to allow for some mortality, densities will not be increased substantially.
- Trees will be planted at an average 12-15' on center and shrubs will be planted at average 6-8' on center.
- Plants will be installed throughout the repair site where conditions allow. Impediments would be soil conditions, impervious substrate, channel capacity issues, and maintenance access.
- Plants will be installed as close to the water as possible. Plantings will not be installed solely at the top of bank.
- Plant material will be from local stock and, when possible, watershed-specific.
- Planting will be done in Fall or early Winter to take advantage of seasonal rainfall to aid establishment.
- Bank stabilization sites will not have an irrigation system per se, but infrastructure to facilitate establishment irrigation will be designed into the project. This could take the form of basins for hand watering, Dri-Water, or other similar measures.

Establishment Maintenance

Revegetation on bank stabilization project will have an establishment maintenance period of a minimum of two years. Limited maintenance will continue after the initial two years if project needs warrant these activities. Maintenance will consist of supplemental watering, weed control, rodent control, protection from vandalism, and regular inspections. Replanting will only be done if significant numbers of plants die or are damaged by flows during the establishment maintenance period. The goal of the planting is to get adequate habitat established at each project site.

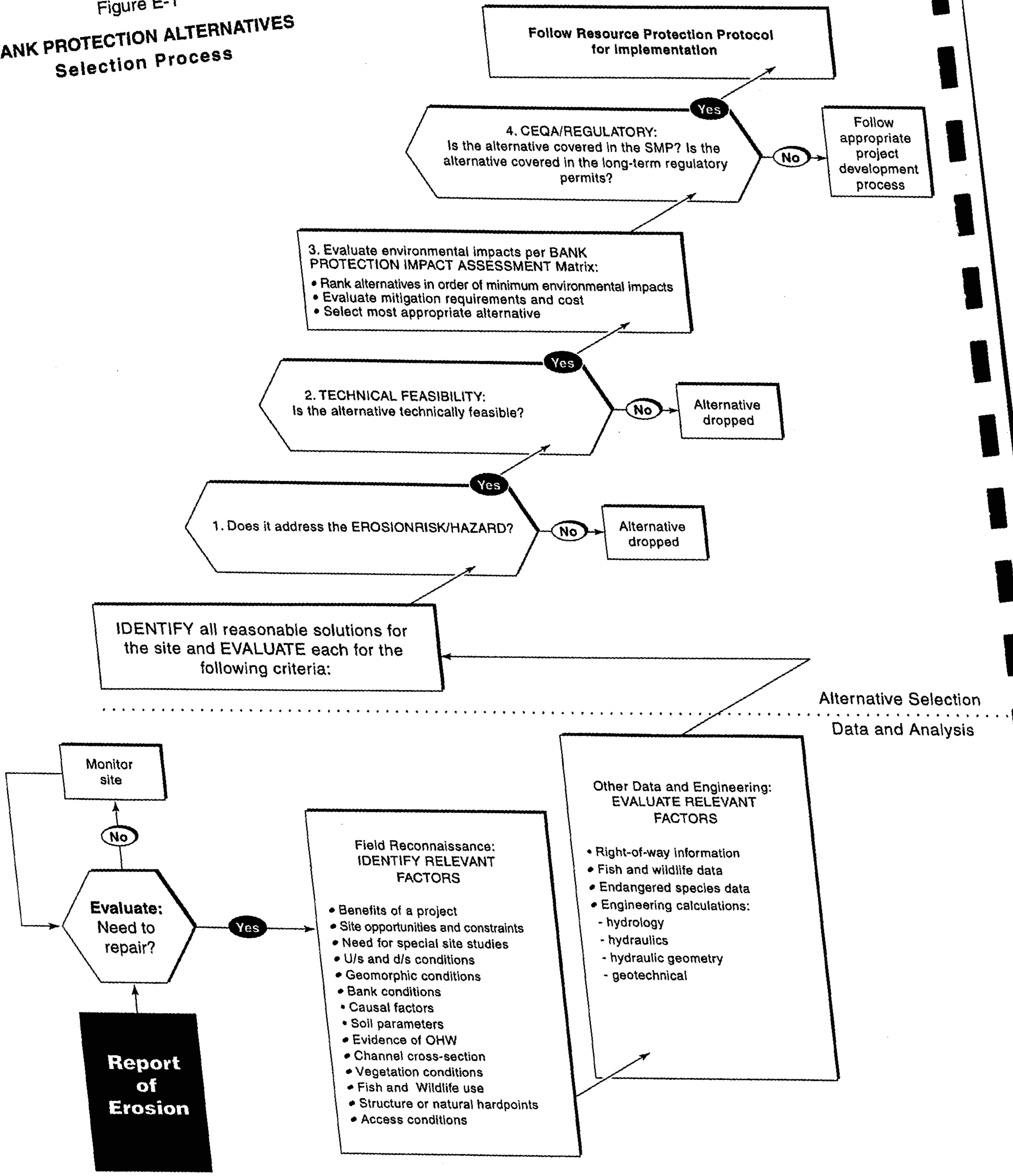
Monitoring/Reporting

Monitoring for bank stabilization planting projects will consist of regular inspections of all planted sites that are under maintenance. The results of these inspections will be consolidated into a narrative report and included as a section in the annual work report.

Work areas and mitigation efforts will be tracked on an annual basis and reported to the agencies. For the first five years, the District will provide the agencies with a tour after completion of the work season of representative work areas (especially those along target streams) for that year and all mitigation sites. Pre-construction photographs will be provided.

Figure E-1

BANK PROTECTION ALTERNATIVES
Selection Process


Follow Resource Protection Protocol for Implementation
Yes
4. CEQA/REGULATORY: Is the alternative covered in the SMP? Is the alternative covered in the long-term regulatory permits?
No
Follow appropriate project development process
3. Evaluate environmental impacts per BANK PROTECTION IMPACT ASSESSMENT Matrix:
• Rank alternatives in order of minimum environmental impacts
• Evaluate mitigation requirements and cost
• Select most appropriate alternative
Yes
2. TECHNICAL FEASIBILITY: Is the alternative technically feasible?
No
Alternative dropped
Yes
1. Does it address the EROSIONRISK/HAZARD?
No
Alternative dropped
IDENTIFY all reasonable solutions for the site and EVALUATE each for the following criteria:
Alternative Selection
Data and Analysis
Monitor site
No
Evaluate: Need to repair?
Yes
Report of Erosion
Field Reconnaissance: IDENTIFY RELEVANT FACTORS
• Benefits of a project
• Site opportunities and constraints
• Need for special site studies
• U/s and d/s conditions
• Geomorphic conditions
• Bank conditions
• Causal factors
• Soil parameters
• Evidence of OHW
• Channel cross-section
• Vegetation conditions
• Fish and Wildlife use
• Structure or natural hardpoints
• Access conditions
Other Data and Engineering: EVALUATE RELEVANT FACTORS
• Right-of-way information
• Fish and wildlife data
• Endangered species data
• Engineering calculations:
- hydrology
- hydraulics
- hydraulic geometry
- geotechnical

BANK PROTECTION MEASURES

Identification No.	Method	Mitigation Ratio	Requires Plan Review by Agencies
#1	Earth Repair	1:1; none if includes seeding or other methods of planting vegetation.	
#2	Live Construction	None	
#2A	Live Construction with Boulder Toe Protection	1:1 if boulder toe is vegetated; 3:1 if boulder toe is not vegetated	
#3	Contour Wattling	None	
#3A	Contour Wattling with Boulder Toe Protection	1:1 if boulder toe is vegetated; 3:1 if boulder toe is not vegetated	
#4	Brush Mattress (Brush Layering)	None	
#4A	Brush Mattress (Brush Layering) with Boulder Toe Protection	1:1 if boulder toe is vegetated; 3:1 if boulder toe is not vegetated	
#5	Surface Matting (Erosion Mats)	1:1; none if includes seeding or other methods of planting vegetation.	
#5A	Surface Matting (Erosion Mats) with Boulder Toe Protection	1:1 if boulder toe is vegetated; 3:1 if boulder toe is not vegetated	
#6	Root Wads and Boulders	1:1	
#7	Cellular Confinement System	3:1	√
#7A	Cellular Confinement System with Vortex Weirs	3:1	√
#8	Rock Blanket	3:1	√
#8A	Boulder Rip-Rap	3:1	√

Identification No.	Method	Mitigation Ratio	Requires Plan Review by Agencies
#8B	Boulder Rip-Rap with Soil and Revegetation	1:1	√
#8C	Boulder Rip-Rap, with Soil and Revegetation and Vortex Weir	1:1	√
#9	Stepped Gabions	3:1	√
#9A	Stepped Gabions with Planted Area	1:1	√
#9B	Stepped Gabions with Planted Area and Vortex Rock Weirs	1:1	√
#10	Articulated Concrete Blocks	3:1	√
#10A	Articulated Concrete Blocks with Planted Areas	1:1	√
#10B	Articulated Concrete Blocks with Planting Areas and Vortex Rock Weirs	1:1	√
#11	Concrete Crib Walls	3:1	√
#11A	Concrete Crib Walls with Vortex Rock Weirs	3:1	√
#12	Live Log Crib Walls	1:1 if proposed softer methods are infeasible and site is vegetated.	√
#12A	Live Log Crib Walls with Vortex Rock Weirs	1:1 if proposed softer methods are infeasible and site is vegetated.	√
#13	Sacked Concrete	3:1	√
#13A	Sacked Concrete with Vortex Rock Weirs	3:1	√
#14	Gunite Slope Protection	3:1	√

Bank Protection Measures

#1: Earth Repair

Description:

Earth repair involves the replacement and repair of eroded channel banks using compacted soil. The eroded slope is scarified and readied for fill placement. A key is cut into the bank. Fill is placed and compacted to 90% in 8-inch lifts. The new slope is trimmed to a 2:1 slope. The surface is seeded with fast sprouting grass species like rye.

The fill material needs to be appropriate to this purpose. There should be no deleterious or organic material or other debris contained in the fill. The Atterberg Plasticity Index of the material should be between 15 and 25, with the Liquid Limit no higher than 40. The material must contain at least 20 percent clay (by weight) passing U.S. standard sieve number 200. The fill must be placed in 8-inch or less lifts and at a minimum relative compaction of 90%.

Design Criteria:

Appropriate on bank slopes of 2:1 or flatter.

Appropriate for local stream velocities of 6 feet per second or less.

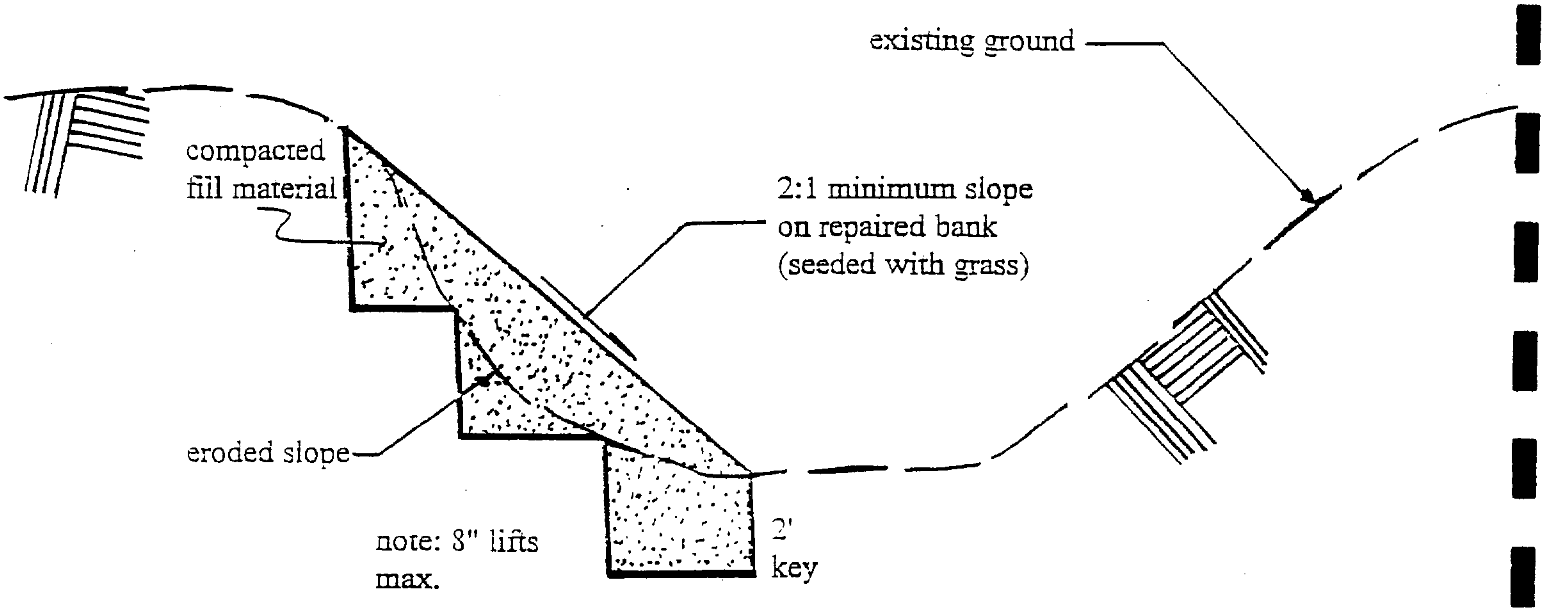
Habitat Impact Assessment:

In-stream:	Provides limited biotic resources
Stream-side:	Provides limited biotic resources

See SMP, Appendix E, Bank Protection Assessment Matrix for assessment details.

Bank Protection Measures

#1: Earth Repair



Section

Bank Protection Measures

#2: Live Construction

Description:

Live construction consists of traditional methods of grading stable slopes and planting live grasses and other plants to control erosion. Vegetation planting methods commonly used include cuttings, transplants, live staking, and direct seeding (including hydro-seeding). Plants are chosen on the basis of drought tolerance and erosion control effectiveness. Biodegradable erosion control materials would be used where necessary in conjunction with live construction to assist in plant establishment.

Excellent revegetation potential. Most successful on streambanks where moderate erosion and channel migration are anticipated. Bank slope, eroding velocity, and reinforcement at the toe of the bank are limiting factors. Enhances conditions for colonization of native species. Streambank soil materials, probable groundwater fluctuation, and bank loading conditions are factors for determining appropriate design[1].

Design Criteria:

Appropriate on bank slopes of 3:1 or flatter.

Appropriate for local stream velocities of 6 feet per second or less.

Soil moisture conditions and availability of water year-around determines appropriate vegetation species (see planting palette).

Habitat Impact Assessment:

In-stream:	Enhances biotic resources
Stream-side:	Enhances biotic resources

See SMP, Appendix E, Bank Protection Assessment Matrix for assessment details.

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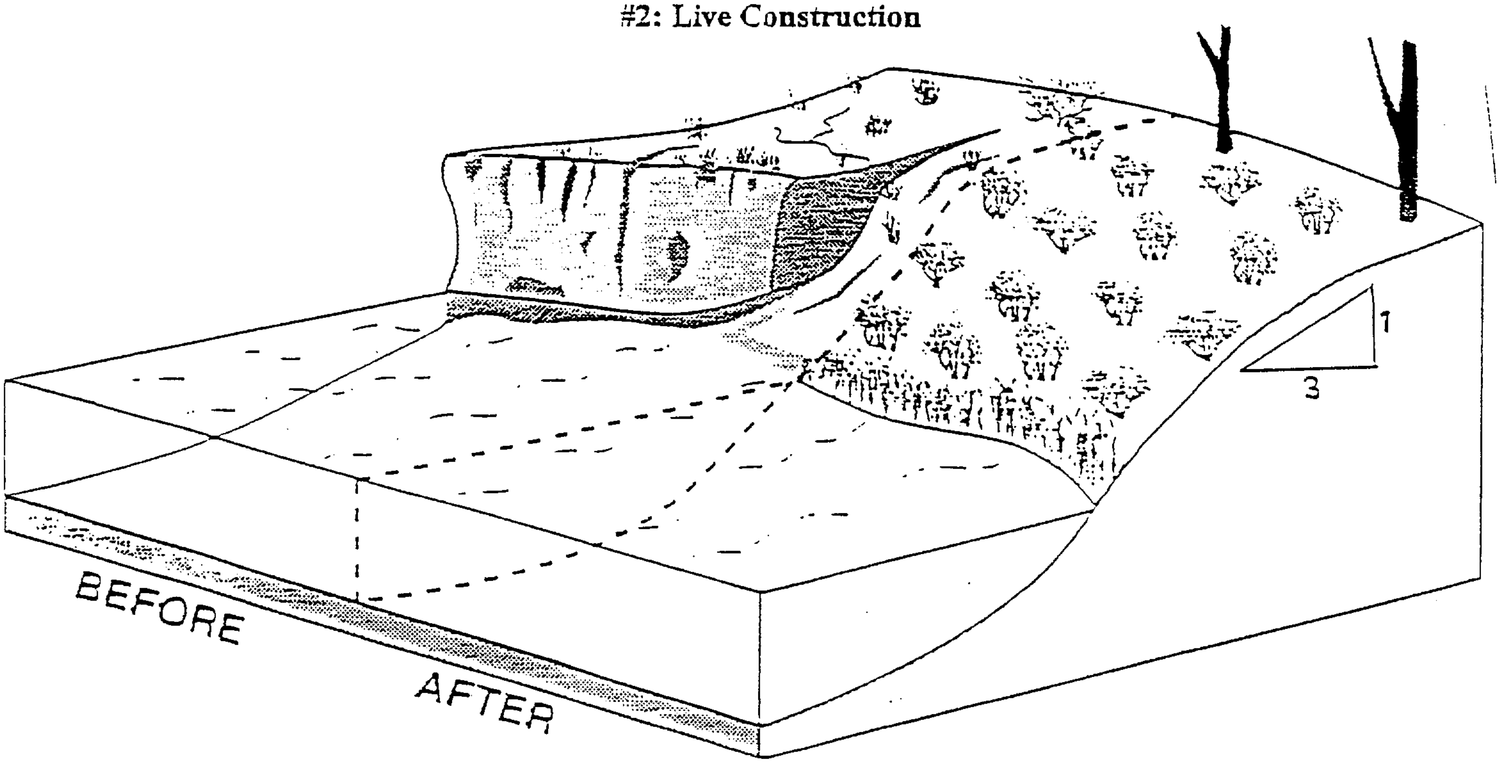
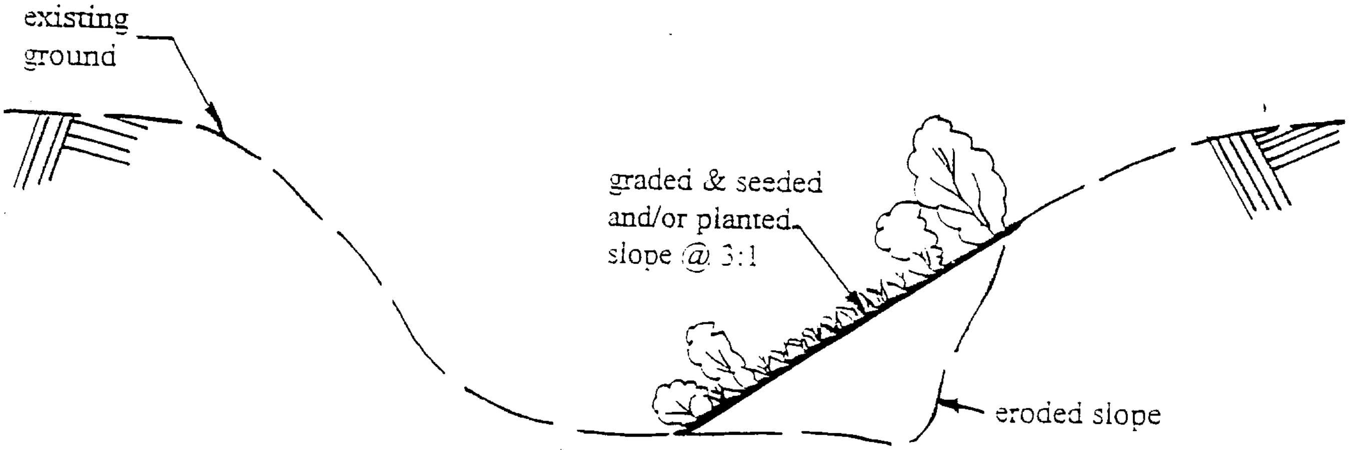
[1] Source: Natural Resources Conservation Service, Stream Corridor Restoration Principles, Processes and Practices

Bank Protection Measures

#2: Live Construction



Source: Natural Resources Conservation Service. Stream Corridor Restoration Principles, Processes and Practices



Section

Bank Protection Measures

#2A: Live Construction with Boulder Toe Protection

Description:

Live construction consists of traditional methods of grading a flatter slope and planting live grasses and other plants to control erosion. Vegetation planting methods commonly used include cuttings, transplants, live staking, and direct seeding (including hydro-seeding). Plants are chosen on the basis of drought tolerance and erosion control effectiveness. Biodegradable erosion control materials are used where necessary in conjunction with live construction to assist in plant establishment.

Boulders (24" to 5 ton) are placed at the toe of the rebuilt bank up to the ordinary high water elevation. Voids in between the boulders can be planted using live stakes[1].

Excellent revegetation potential. Enhances conditions for colonization of native species. Streambank soil materials, probable groundwater fluctuation, and bank loading conditions are factors for determining appropriate design[1].

Design Criteria:

Appropriate on bank slopes of 3:1 or flatter for live construction section, 1.5:1 or flatter for boulder section.

Boulders must be keyed in (min. 3 feet) at the toe of bank.

Appropriate for local stream velocities of 6 feet per second or less.

Soil moisture conditions and availability of water year-around determines appropriate vegetation species (See plant palette).

Habitat Impact Assessment:

In-stream:	Enhances biotic resources
Stream-side:	Enhances biotic resources

See SMP, Appendix E, Bank Protection Assessment Matrix for assessment details.

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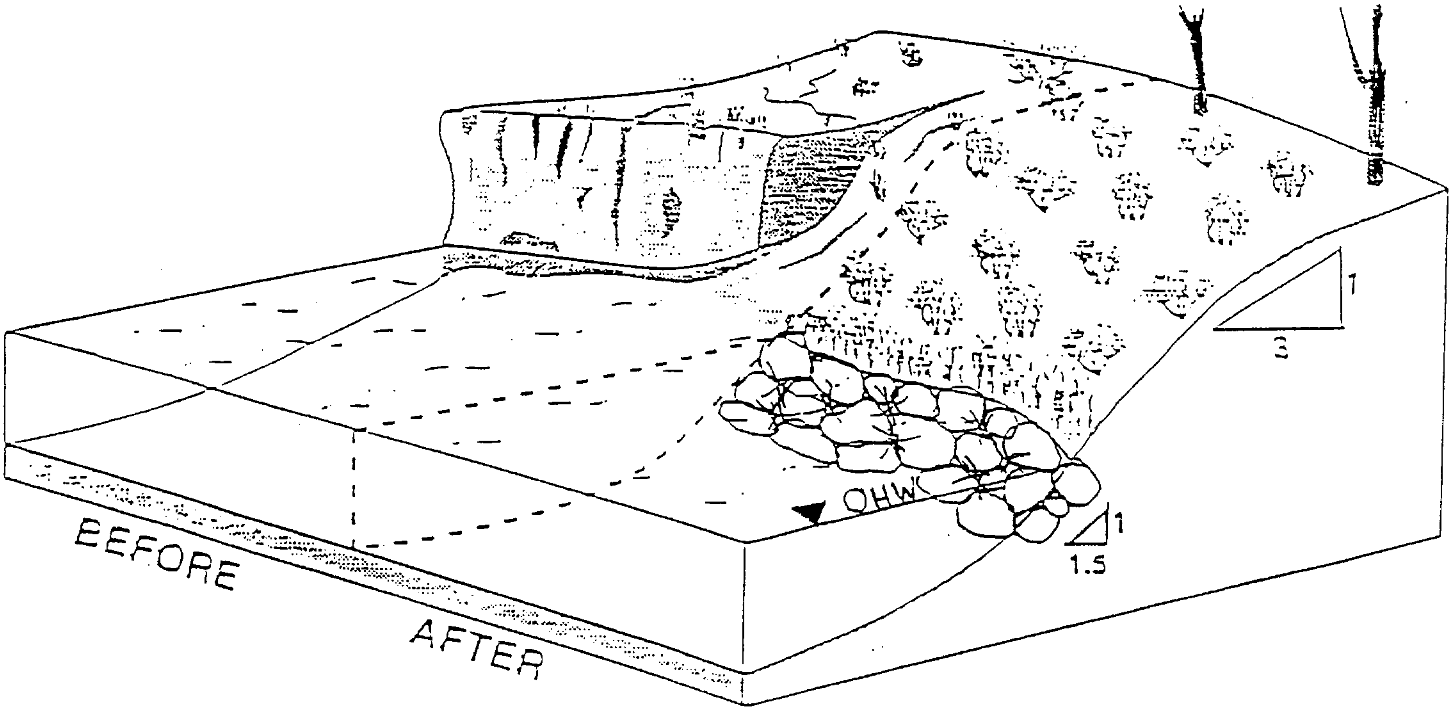
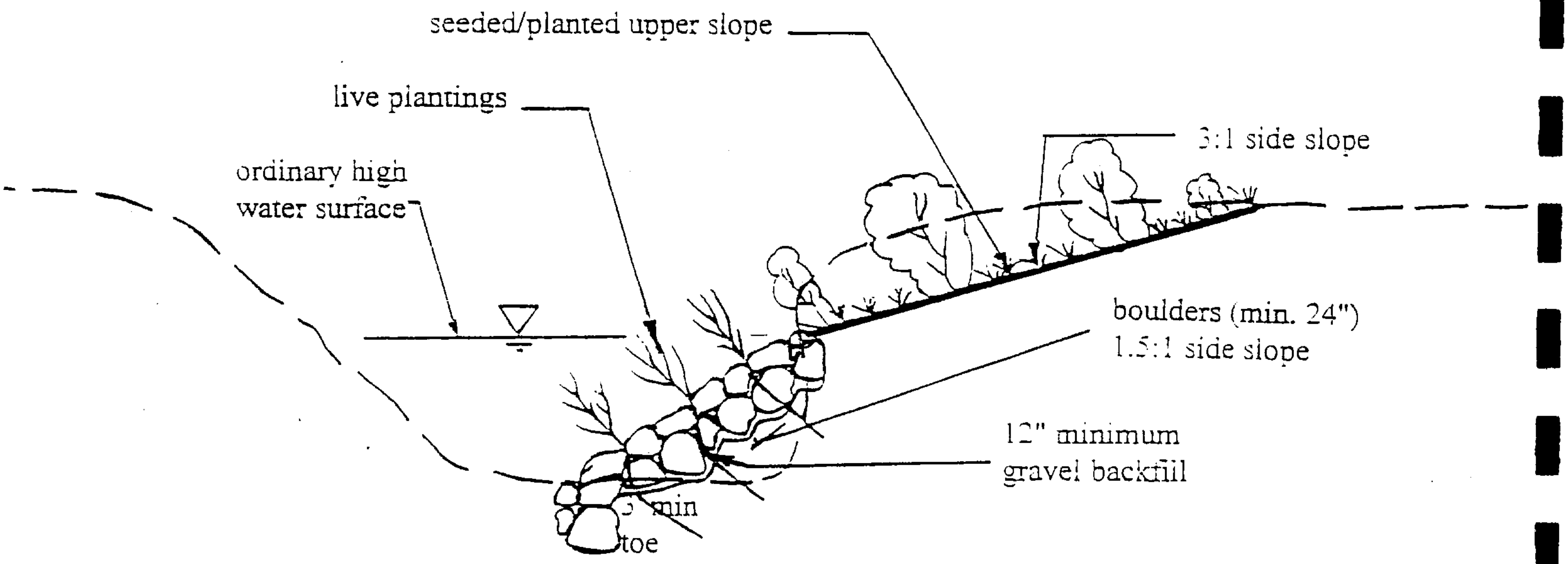
[1] Source: Natural Resources Conservation Service, Stream Corridor Restoration Principles, Processes and Practices

Bank Protection Measures

#2A: Live Construction with Boulder Toe Protection



Source: Adapted from Natural Resources Conservation Service. Stream Corridor Restoration Principles, Processes and Practices



Section View

Bank Protection Measures

#3: Contour Wattling

Description:

This method consists of tying long bundles of plant stems (typically willows or cottonwood) together with twine and anchoring them in shallow trenches with wooden stakes. When the stems develop root systems and mature, the plants establish structural soil stabilization properties. This technique is generally used to manage surface erosion.

Excellent revegetation potential. The long bundles trap and hold soil on banks by creating small, dam-like structures, effectively cutting the slope length into a series of shorter slope lengths. This method enhances the conditions for colonization by native species and should, where appropriate, be used with other soil bioengineering systems and live plantings. Reinforcement at the toe of bank may be a limiting factor (see BPM #3A). Not appropriate for treatment of slopes actively undergoing mass earth movement[1].

Design Criteria:

Appropriate on bank slopes of 2:1 or flatter.

Appropriate for local stream velocities of 6 feet per second or less.

Habitat Impact Assessment:

In-stream:	Enhances biotic resources
Stream-side:	Enhances biotic resources

See SMP, Appendix E, Bank Protection Assessment Matrix for assessment details.

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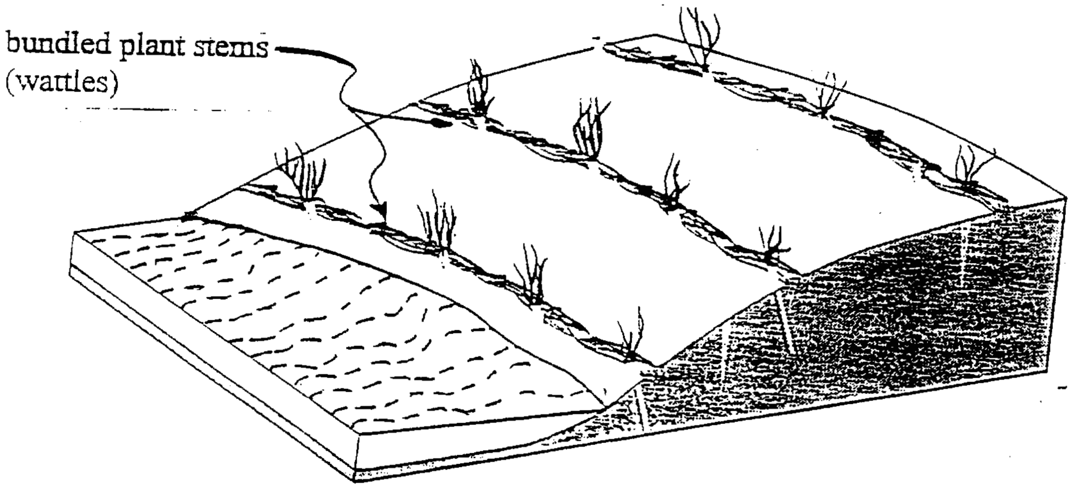
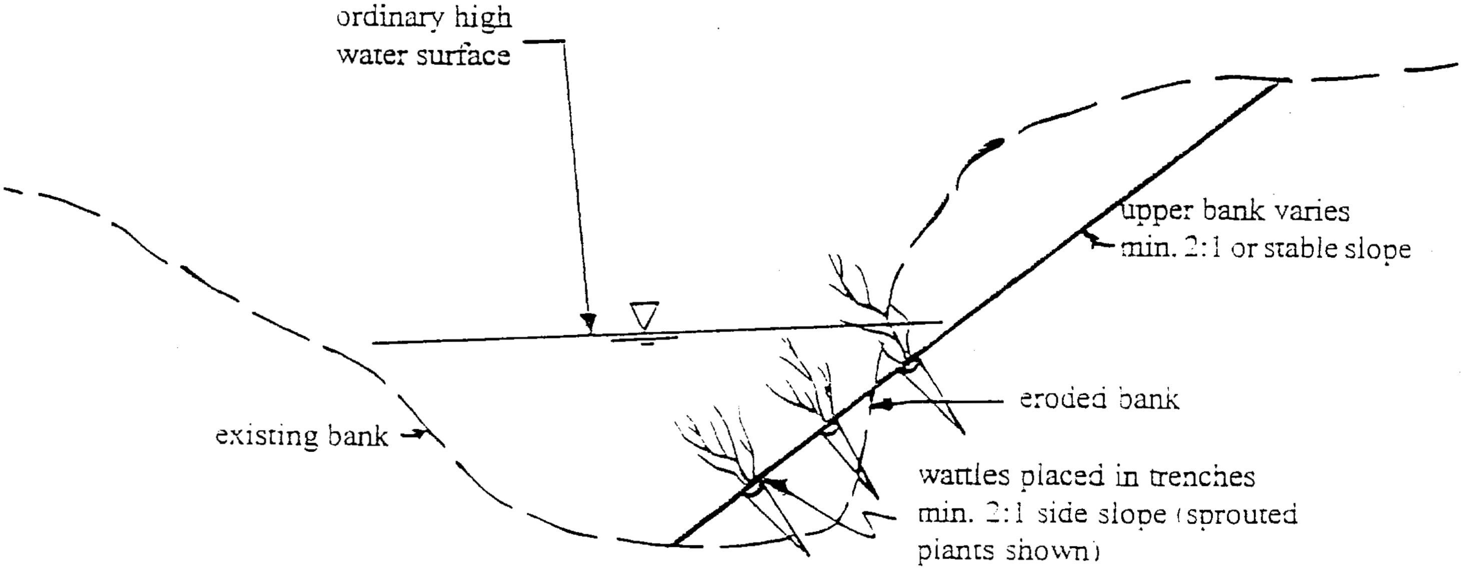
[1] Source: Natural Resources Conservation Service, Stream Corridor Restoration Principles, Processes and Practices

Bank Protection Measures

#3: Contour Wattling



Source: Natural Resources Conservation Service. Stream Corridor Restoration Principles. Processes and Practices



Section

Bank Protection Measures

#3A: Contour Wattling with Boulder Toe Protection

Description:

This method consists of tying long bundles of plant stems together with twine and anchoring them in shallow trenches with wooden stakes. When the stems develop root systems and mature, the plants establish structural soil stabilization properties.

Boulders (24" to 5 ton) are placed at the toe of the rebuilt bank up to the ordinary high water elevation. Voids in between the boulders can be planted using live stakes[1].

Excellent revegetation potential. The long bundles trap and hold soil on banks by creating small, dam-like structures, effectively cutting the slope length into a series of shorter slope lengths. This method enhances the conditions for colonization by native species and should, where appropriate, be used with other soil bioengineering systems and live plantings. Not appropriate for treatment of slopes actively undergoing mass earth movement[1].

Design Criteria:

Appropriate on bank slopes of 2:1 or flatter for contour wattling section of slope. 1.5:1 or flatter for boulder section.

Boulders must be keyed in (min. 3 feet) at toe of bank.

Appropriate for local stream velocities of 6 feet per second or less.

Habitat Impact Assessment:

In-stream:	Enhances biotic resources
Stream-side:	Enhances biotic resources

See SMP, Appendix E, Bank Protection Assessment Matrix for assessment details.

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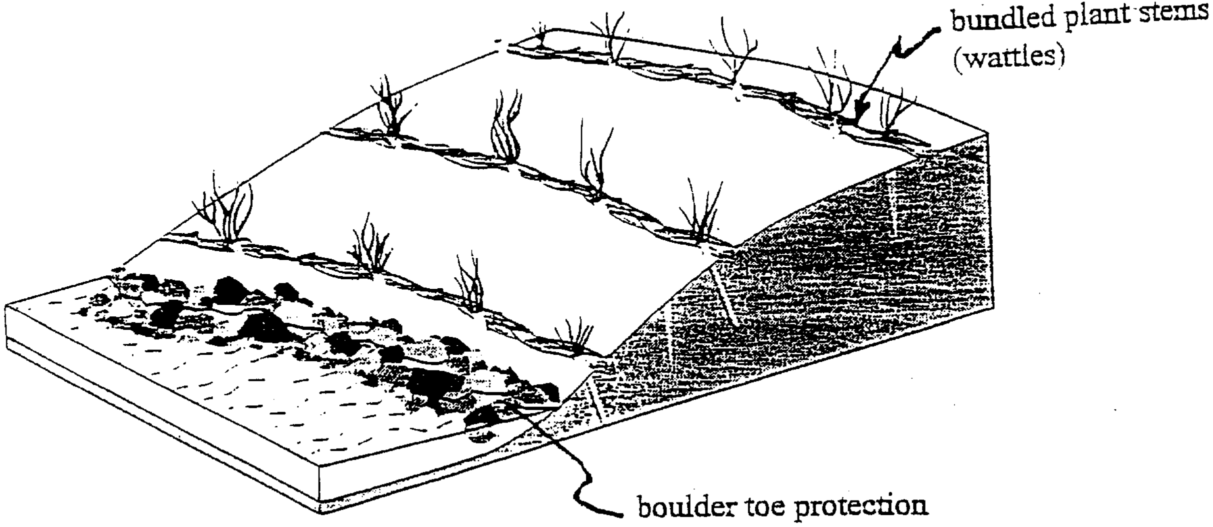
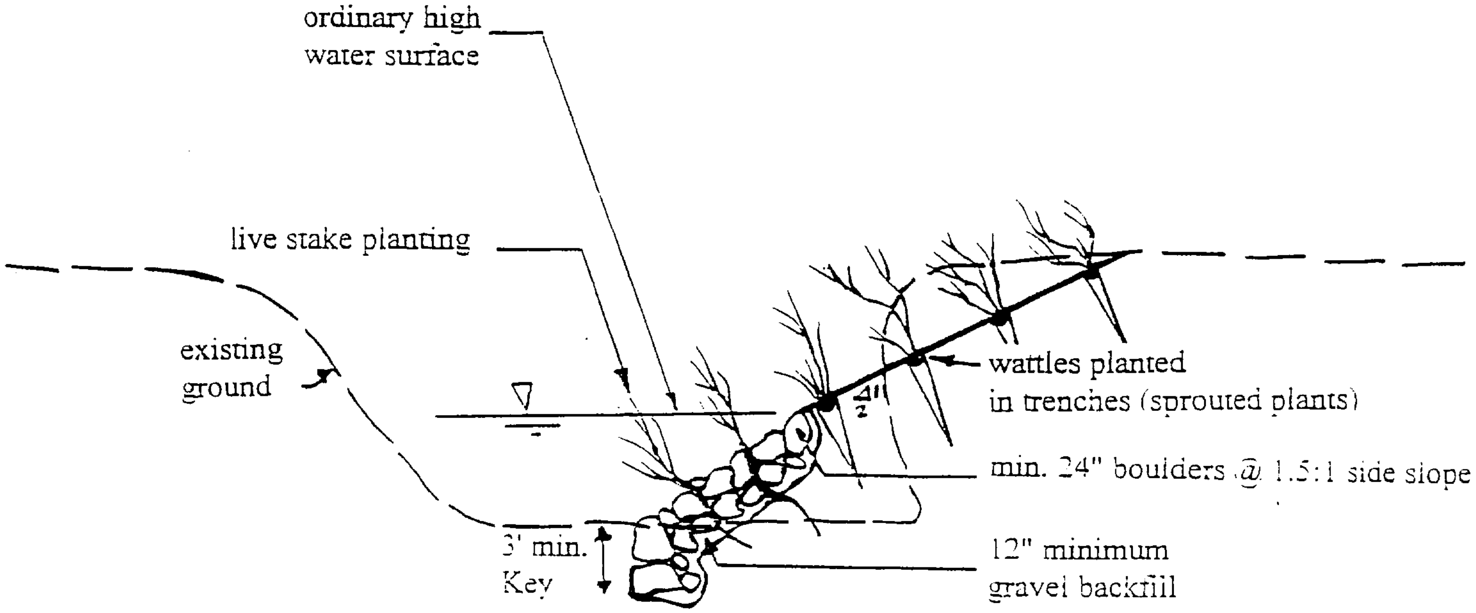
[1] Source: Natural Resources Conservation Service, Stream Corridor Restoration Principles, Processes and Practices

Bank Protection Measures

#3A: Contour Wattling with Boulder Toe Protection



Source: Natural Resources Conservation Service. Stream Corridor Restoration Principles. Processes and Practices



Section

Bank Protection Measures

#4: Brush Mattress (Brush Layering)

Description:

The eroded slope is graded and smoothed to ensure all willows are in contact with soil. A (min.) 2 foot deep trench is dug at the toe of the bank for the butt ends of the willow branches. Wood, steel, or live willow stakes are partially driven in rows on three foot centers in the area that will be covered by the mattress. After the stakes have been placed, live willow branches are put on the bank with their butt ends in the trench. Straight branches no shorter than 4 feet in length and ½" to 1" in diameter are used. If the branches are not long enough to reach the upper end of mattress, several layers may be used; however, it is necessary to "shingle" the layers by lapping each new layer over the one below by at least 18". Once the bank is covered by a thick layer of willows, cross branches are placed horizontally over the bottom layer. These branches are placed against the stakes and then tied to the stakes using wire or string. The stakes are then driven into the bank a minimum of two feet or deeper, if possible. After the completion of the mattress, the toe trench is filled with appropriately sized boulders and rocks to anchor the butt ends of the branches. The entire mattress is then covered by earth or fine stream material[1].

This method forms an immediate protective cover over the stream bank, captures sediment during flood flows, and rapidly restores riparian vegetation and streamside habitat. This measure is not appropriate where toe scour is anticipated (see BPM #4A). This method should not be used on slopes that are experiencing ongoing mass movement or other slope instability[2].

Design Criteria:

Appropriate on bank slopes of 2:1 or flatter.

Appropriate for local stream velocities of 6 feet per second or less.

Habitat Impact Assessment:

In-stream:	Enhances biotic resources
Stream-side:	Enhances biotic resources

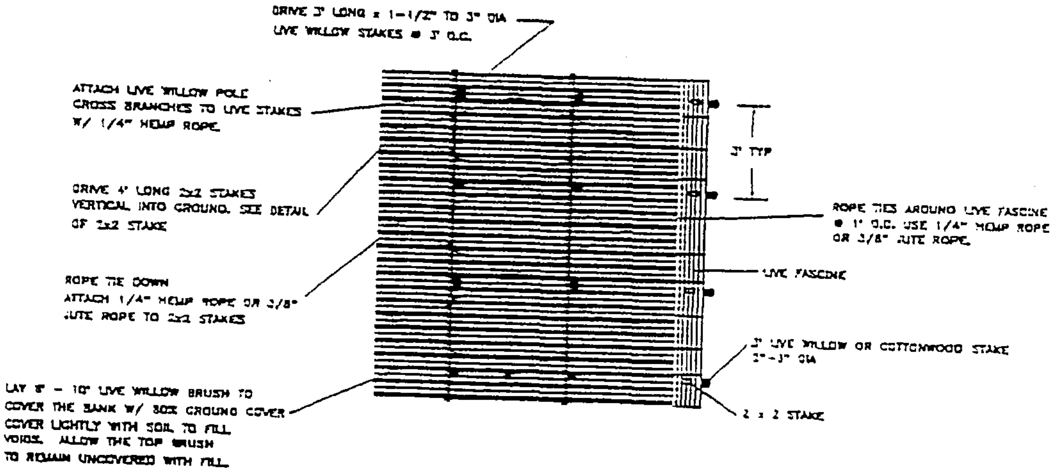
See SMP, Appendix E, Bank Protection Assessment Matrix for assessment details.

[1] Source: California Department of Fish and Game, California Salmonid Stream Habitat Restoration Manual

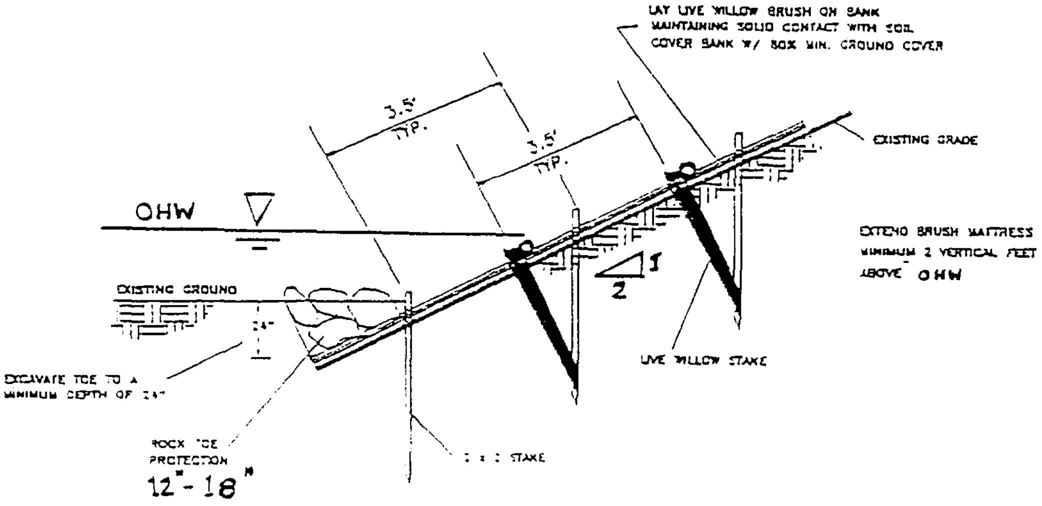
[2] Source: Natural Resources Conservation Service, Stream Corridor Restoration Principles, Processes and Practices

Bank Protection Measures

#4: Soil Bioengineering : Brush Mattress (Brush Layering)


DRIVE 3' LONG x 1-1/2" TO 3" DIA LIVE WILLOW STAKES @ 3' O.C.
ATTACH LIVE WILLOW POLE CROSS BRANCHES TO LIVE STAKES W/ 1/4" HEMP ROPE
DRIVE 4' LONG 2x2 STAKES VERTICAL INTO GROUND. SEE DETAIL OF 2x2 STAKE
ROPE TIE DOWN ATTACH 1/4" HEMP ROPE OR 3/8" JUTE ROPE TO 2x2 STAKES
LAY 8" - 10" LIVE WILLOW BRUSH TO COVER THE BANK W/ 80% GROUND COVER COVER LIGHTLY WITH SOIL TO FILL VOIDS. ALLOW THE TOP BRUSH TO REMAIN UNCOVERED WITH FILL
3' TYP
ROPE TIES AROUND LIVE FASCINE @ 1' O.C. USE 1/4" HEMP ROPE OR 3/8" JUTE ROPE
LIVE FASCINE
3' LIVE WILLOW OR COTTONWOOD STAKE 2"-3" DIA
2 x 2 STAKE

Plan View


LAY LIVE WILLOW BRUSH ON BANK MAINTAINING SOLID CONTACT WITH SOIL COVER BANK W/ 80% MIN. GROUND COVER
3.5' TYP.
3.5' TYP.
EXISTING GRADE
OHW
EXTEND BRUSH MATTRESS MINIMUM 2 VERTICAL FEET ABOVE OHW
EXISTING GROUND
1
2
24"
LIVE WILLOW STAKE
EXCAVATE TOE TO A MINIMUM DEPTH OF 24"
ROCK TOE PROTECTION 12"-18"
2 x 2 STAKE

Cross Section

Source: Adapted from California Department of Fish and Game. California Salmonid Stream Habitat Restoration Manual

Bank Protection Measures

#4A: Brush Mattress (Brush Layering) with Boulder Toe Protection

Description:

The lower portion of the eroded slope (Below Ordinary High Water OHW) is graded (at a maximum of 1.5:1 slope). The upper portion of the slope is graded (at a minimum slope of 2:1) and smoothed to ensure all willows are in contact with soil. Boulders (24" to 5 ton) are placed at the toe of the rebuilt bank up to the ordinary high water elevation. Voids between the boulders can be planted using live stakes[2].

A (min.) 2 foot deep trench is dug at the top of the boulder line for the butt ends of the willow branches. Wood, steel, or live willow stakes are partially driven in rows on three foot centers in the area that will be covered by the mattress. After the stakes have been placed, live willow branches are put on the bank with their butt ends in the trench. Straight branches no shorter than 4 feet in length and ½" to 1" in diameter are used. If the branches are not long enough to reach the upper end of mattress, several layers may be used; however, it is necessary to "shingle" the layers by lapping each new layer over the one below by at least 18". Once the bank is covered by a thick layer of willows, cross branches are placed horizontally over the bottom layer. These branches are placed against the stakes and then tied to the stakes using wire or string. The stakes are then driven into the bank a minimum of two feet or deeper, if possible. After the completion of the mattress, the toe trench is back-filled with boulders and rocks to anchor the butt ends of the branches. The entire mattress is then covered by earth or fine stream material[1].

This method forms an immediate protective cover over the stream bank, captures sediment during flood flows, and rapidly restores riparian vegetation and streamside habitat. This method should not be used on slopes that are experiencing ongoing mass movement or other slope instability[2].

Design Criteria:

Appropriate on bank slopes of 2:1 or flatter for brush mattress section of slope, 1.5:1 or flatter for the boulder section.

Boulders must be keyed in (min. 3 feet) at toe of bank.

Appropriate for local stream velocities of 6 feet per second or less.

Habitat Impact Assessment:

In-stream:	Enhances biotic resources
Stream-side:	Enhances biotic resources

See SMP, Appendix E, Bank Protection Assessment Matrix for assessment details.

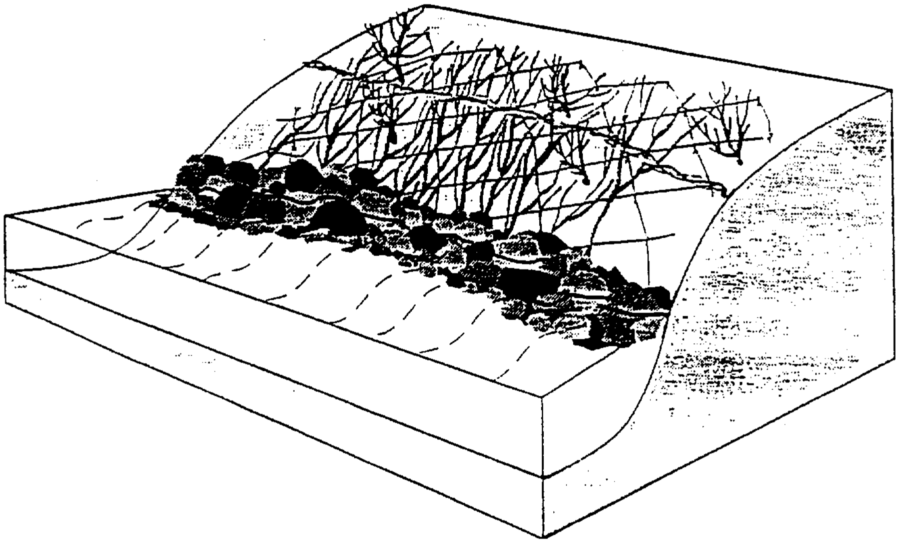
---

[1] Source: California Department of Fish and Game, California Salmonid Stream Habitat Restoration Manual

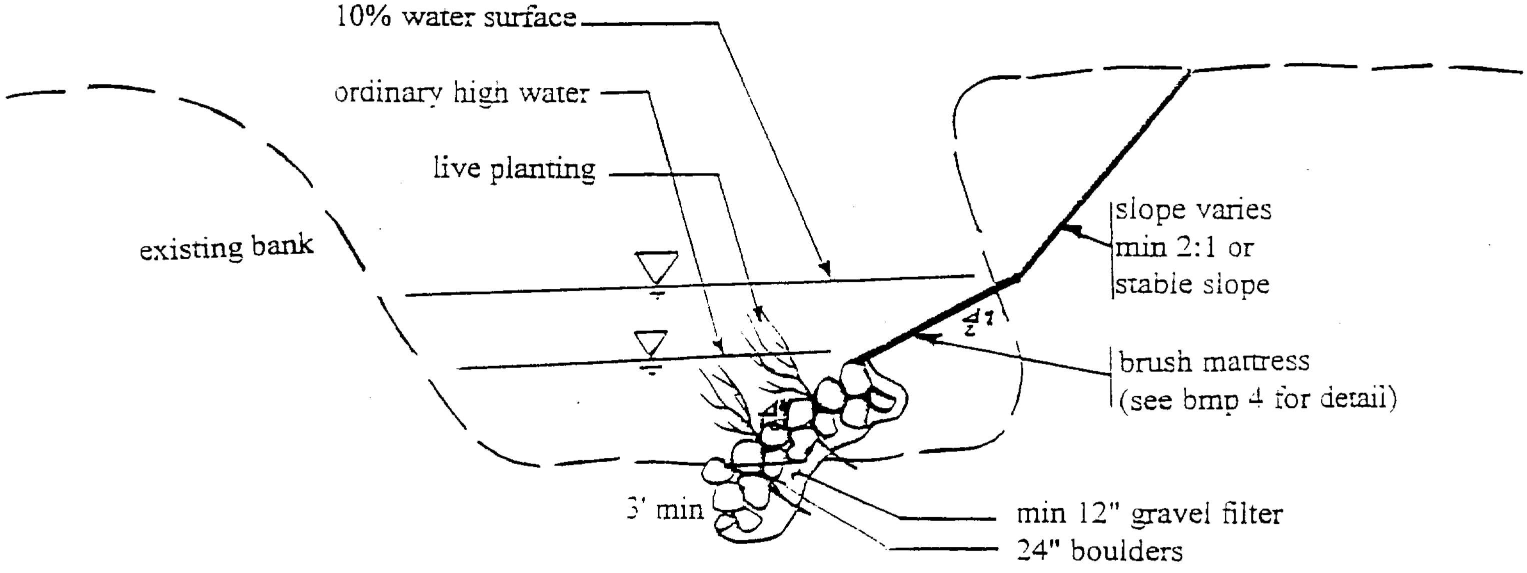
[2] Source: Natural Resources Conservation Service, Stream Corridor Restoration Principles, Processes and Practices

Bank Protection Measures

#4A: Brush Mattress (Brush Layering) with Boulder Toe Protection



Source: Natural Resources Conservation Service. Stream Corridor Restoration Principles. Processes and Practices



Section

Bank Protection Measures

#5: Surface Matting (Erosion Mats)

Description:

This method consists of securing plastic, jute, or geotextile fabric surface liners to channel banks using stakes or staples. These materials provide soft armor protection against erosive forces and are combined with live staking and direct seeding. Abrasive sediment, debris, foot traffic, and sunlight will wear, snag, and tear these fabrics with time, potentially undermining the structure. These methods are intended to be the skeleton of a vegetated erosion control system. The establishment of vegetation is crucial to the long-term success of erosion mats.

Work best in small, uniform, improved channels with mild bank slopes. This method has good revegetation potential. Toe protection is required where toe scour is anticipated (see BPM #5A).

Design Criteria:

Appropriate on bank slopes of 2:1 or flatter.

Typically appropriate for local stream velocities of 12 feet per second or less, depending on the type of erosion mat and revegetation method selected.

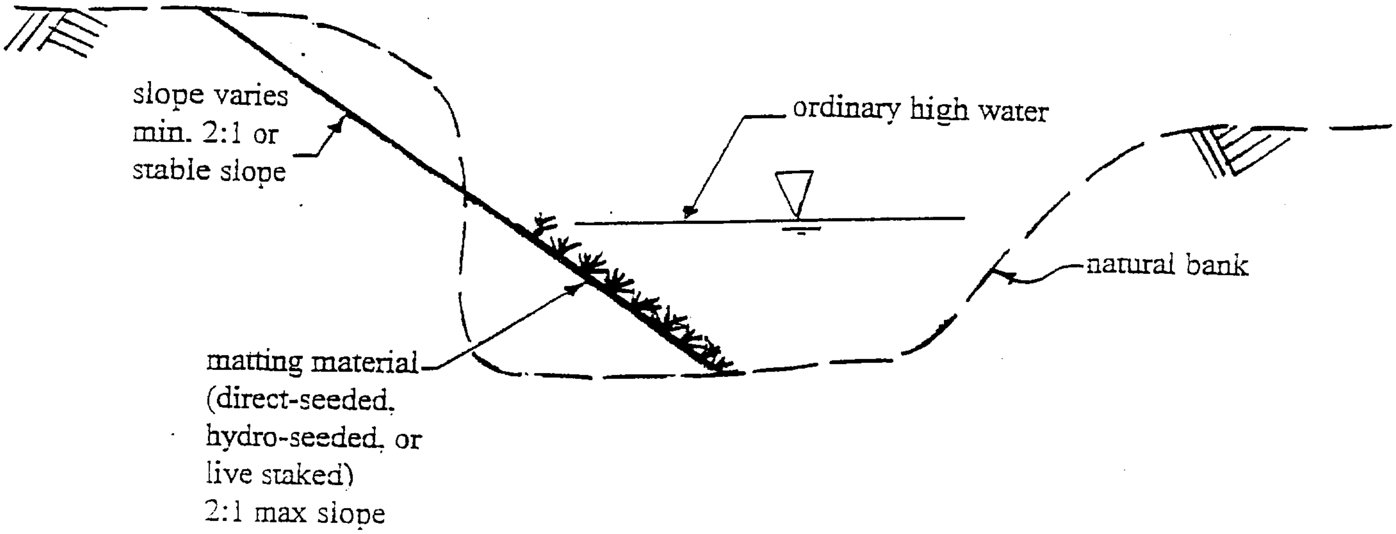
Habitat Impact Assessment:

In-stream:	Provide limited biotic resources
Stream-side:	Provide limited biotic resources

See SMP, Appendix E, Bank Protection Assessment Matrix for assessment details.

Bank Protection Measures

#5: Surface Matting (Erosion Mats)



Section

Bank Protection Measures

#5A: Surface Matting (Erosion Mats) with Boulder Toe Protection

Description:

The lower portion of the eroded slope (Below Ordinary High Water OHW) is graded (at a maximum of 1.5:1 slope). The upper portion of the slope is graded (at a minimum slope of 2:1) and smoothed to ensure erosion mat is in full contact with soil. Boulders (24" to 5 ton) are placed at the toe of the rebuilt bank up to the ordinary high water elevation. Voids between the boulders can be planted using live stakes

In the upper portion of the slope, plastic, jute, or geotextile fabric surface liners are attached to channel banks using stakes or staples. These materials provide soft armor protection against erosive forces and are combined with live staking and direct seeding. Debris, foot traffic, and sunlight will wear, snag, and tear these fabrics with time. The boulder toe protection will prevent undermining of the structure. These methods are intended to be the skeleton of a vegetated erosion control system.

Work best in uniform improved channels with mild bank slopes. This method has good revegetation potential.

Design Criteria:

Appropriate on bank slopes of 2:1 or flatter for erosion mat section of slope. 1.5:1 or flatter for the boulder section.

Boulders must be keyed in (min. 3 feet) at toe of bank.

Appropriate for local stream velocities of 6 feet per second or less if boulders are planted with live stakes, 12 feet per second if boulders are not planted.

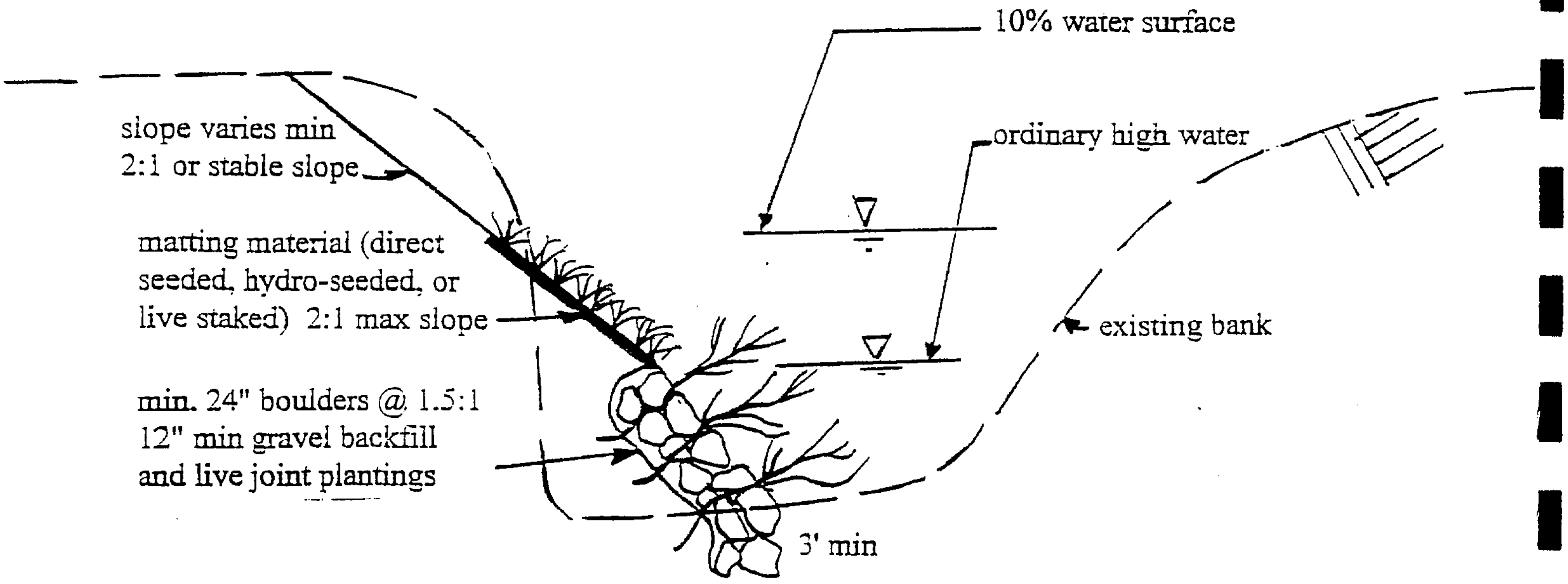
Habitat Impact Assessment:

In-stream:	Enhances biotic resources
Stream-side:	Enhances biotic resources

See SMP, Appendix E, Bank Protection Assessment Matrix for assessment details.

Bank Protection Measures

#5A: Surface Matting (Erosion Mats) with Boulder Toe Protection



Section

Bank Protection Measures

#6: Root Wads and Boulders

Description:

This method combines boulders, logs, and live plant material to armor a stream bank. Fish habitat is enhanced, in addition to creating a natural looking bank stabilization structure[1].

Footer logs are set in a toe trench below the thalweg line, with the channel end pointed downstream and the butt end angled 45 to 60 degrees upstream. A second log (with a root wad) is set on top of the footer log diagonally, forming an "X". The root wad end is set pointing upstream and the butt end lying downstream 45 to 60 degrees. The apex of the logs are anchored together using boulders, re-bar or cables. Large boulders are placed on top and between the logs at each apex. After all the logs and boulders are set in place, live plant material such as willows are placed within the spaces of the structure, behind the boulders. Excavated gravel and stream materials can then be placed over the bank end portion of the structure[1].

This method will tolerate high boundary shear stresses if logs and root wads are well anchored. This method should, where appropriate, be used in conjunction with soil bio-engineering or live vegetation plantings to stabilize the upper bank and ensure a regenerative source of streambank vegetation. The life of the structure depends on the species of logs used. it might need replacement if vegetative colonization does not take place. This method can create local scour (channel bottom) and erosion (opposite bank)[2].

Design Criteria:

Appropriate for channel velocities of 10 feet per second or less.

Habitat Impact Assessment:

In-stream:	Enhances biotic resources
Stream-side:	Enhances biotic resources

See SMP. Appendix E. Bank Protection Assessment Matrix for assessment details.

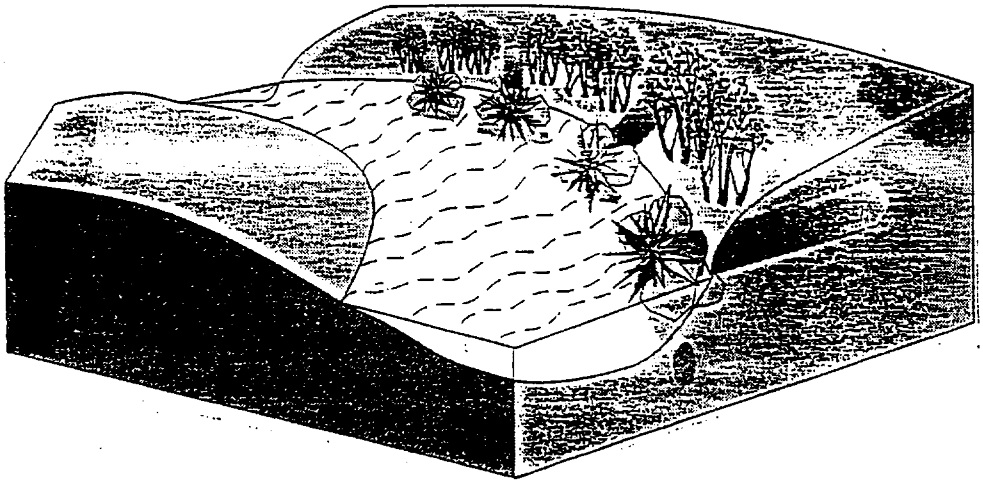
---

[1] Source: California Department of Fish and Game. California Salmonid Stream Habitat Restoration Manual

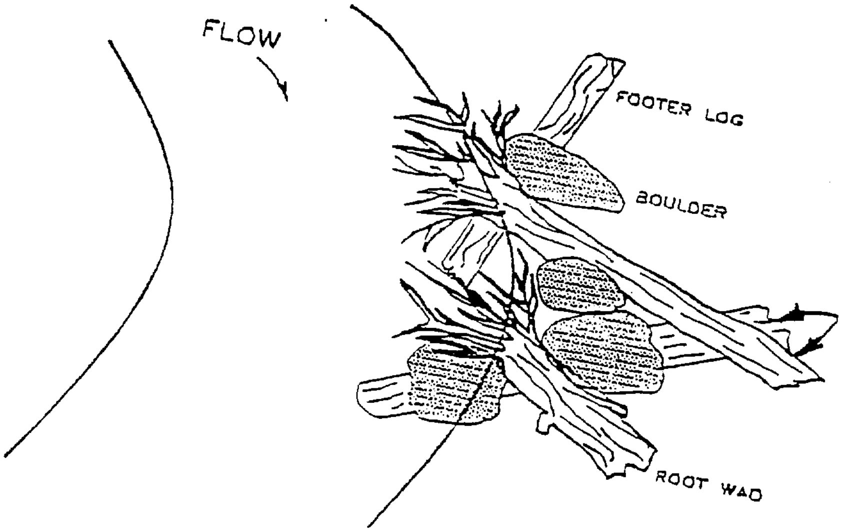
[2] Source: Natural Resources Conservation Service. Stream Corridor Restoration Principles. Processes and Practices

Bank Protection Measures

#6: Root Wads and Boulders

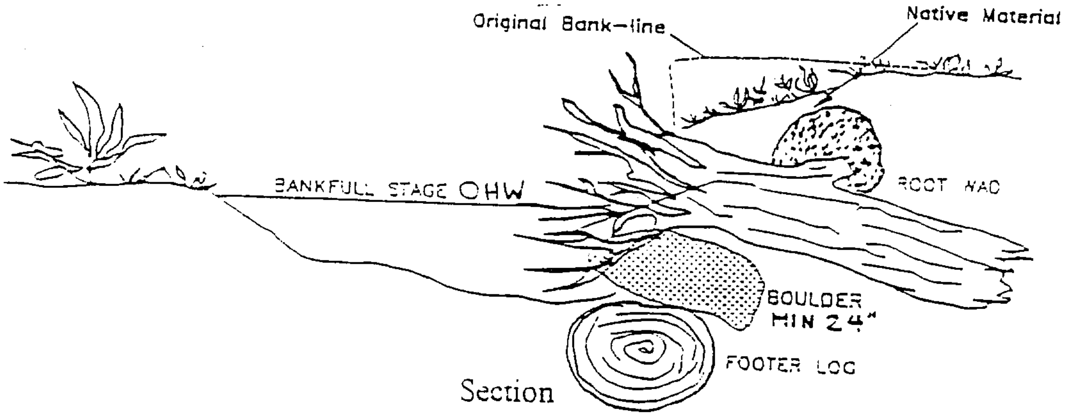


Source: Adapted from Natural Resources Conservation Service. Stream Corridor Restoration Principles, Processes and Practices.



minimum 20 foot logs buried minimum 16 ft into bank

Plan



Section

Source: Adapted from California Department of Fish and Game. California Salmonid Stream Habitat Restoration Manual

Bank Protection Measures

#7: Cellular Confinement System

Description:

Soil cellular confinement system (geocell) is a polyethylene plastic cellular system where structural strength is developed by the composite design of soil, plant roots, and the plastic's cellular configuration. This system is available in 8-inch deep honeycomb mats that are installed in offset vertical layers to create terraced planting areas. The honeycomb cells are filled with soil, moderately compacted, and planted with woody vegetation and grasses. The structure functions similarly to a crib wall structure.

This method has the capability of developing some vegetation potential.

Design Criteria:

Appropriate for slopes up to ½ to 1.

Appropriate for velocities up to 6 feet per second.

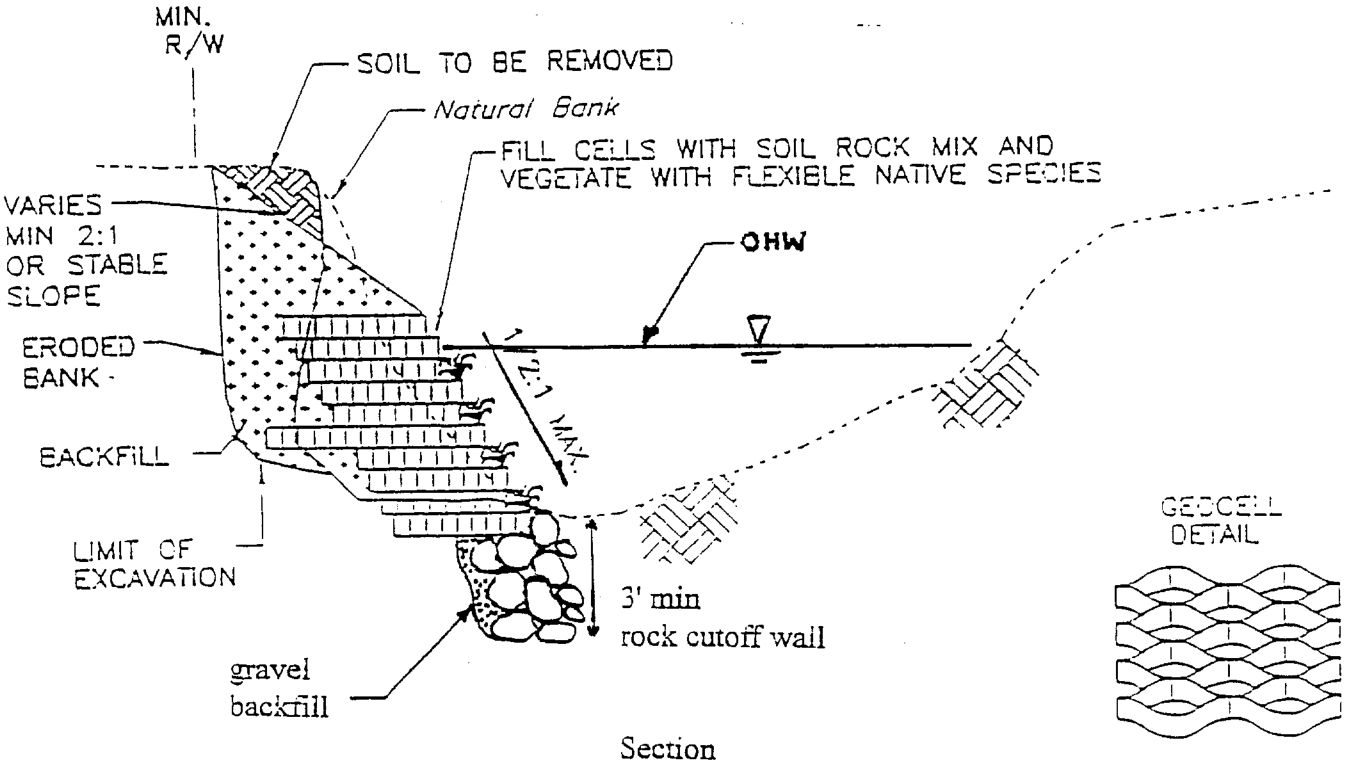
Habitat Impact Assessment:

In-stream:	Reduce or eliminate biotic potential
Stream-side:	Reduce or eliminate biotic potential

See SMP, Appendix E, Bank Protection Assessment Matrix for assessment details.

Bank Protection Measures

#7: Cellular Confinement System



Section

Bank Protection Measures

#7A: Cellular Confinement System with Vortex Weirs

Description:

Soil cellular confinement system (geocell) is a polyethylene plastic cellular system where structural strength is developed by the composite design of soil, plant roots, and the plastic's cellular configuration. This system is available in 8-inch deep honeycomb mats that are installed in offset vertical layers to create terraced planting areas. The honeycomb cells are filled with soil, moderately compacted, and planted with woody vegetation and grasses. The structure functions similarly to a crib wall structure. This method has the capability of developing some ruderal vegetation potential.

Vortex boulder weirs were designed for use in high bedload streams to maintain sediment transport capacity, maintain low width to depth ratios, and provide habitat. Vortex boulder weirs provide instream cover and deepen feeding areas in riffle habitat, provide a wide range of velocities for salmonid holding water at high flows, act as grade control structures without upstream lateral migration, bank erosion, or aggradation, and maintain a low width/depth ratio to reduce sediment deposition[1].

The vortex weirs are placed on the downstream end of the erosion repair project to stabilize the creek profile and protect the foundation of the erosion repair project.

Design Criteria:

Appropriate for slopes up to ½ to 1.

Appropriate for velocities up to 6 feet per second.

Vortex weirs are most appropriate in "F" and "B" type channels, according to Rosgen's stream classification system[1].

Habitat Impact Assessment:

In-stream:	Provides limited biotic resources
Stream-side:	Reduces or eliminates biotic potential

See SMP, Appendix E, Bank Protection Assessment Matrix for assessment details.

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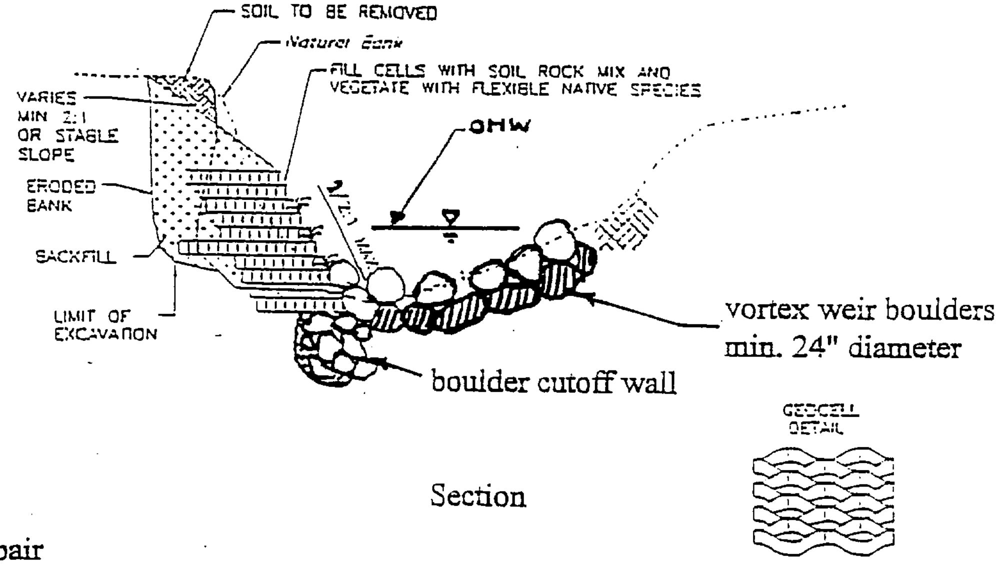
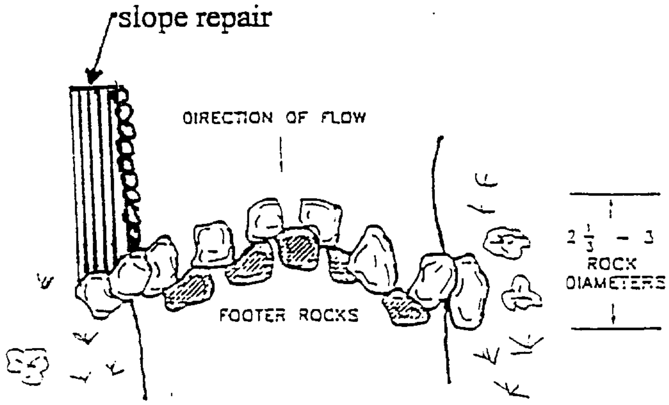
[1] Source: California Department of Fish and Game, California Salmonid Stream Habitat Restoration Manual

Bank Protection Measures

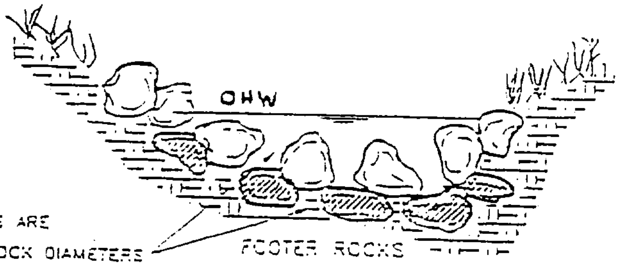
#7A: Cellular Confinement System with Vortex Weirs


SOIL TO BE REMOVED
Natural Bank
FILL CELLS WITH SOIL ROCK MIX AND VEGETATE WITH FLEXIBLE NATIVE SPECIES
VARIES MIN 2:1 OR STABLE SLOPE
OHW
ERODED BANK
BACKFILL
LIMIT OF EXCAVATION
vortex weir boulders min. 24" diameter
boulder cutoff wall
GEOCELL DETAIL

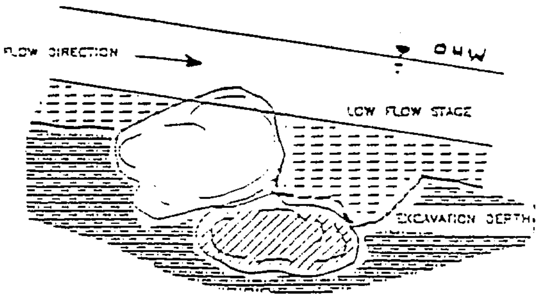
Section



plan view



cross section



profile view

Vortex Weirs: Plan, Section, and Profile

Source: Adapted from California Department of Fish and Game. California Salmonid Stream Habitat Restoration Manual

Bank Protection Measures

#8: Rock Blanket

Description:

This method consists of placing a blanket of appropriately sized rock over the bank to control erosion. The rock is underlain by at least 12 inches of gravel to eliminate washout of underlying soils, which would lead to slope failure in time. This method is appropriate where long term durability is needed, design discharge is high, there is significant threat to life or property, or there is no practical way to otherwise incorporate vegetation into the design. This method should, where appropriate, be used with soil bio-engineering systems or live vegetation to stabilize the upper bank and ensure a regenerative source of streambank vegetation. A major benefit of this method is that the components are flexible and function is not impaired by slight movement from settlement or other adjustments[1].

Angular rock should be used, because they tend to interlock, making the structure act like a single structure rather than a collection of independent stones.

Design Criteria:

Appropriate for slopes up to 1.5 to 1, preferably 2 to 1.

Rock sizes of 6" to 18" (Dia).

Appropriate for velocities up to 15 feet per second.

Habitat Impact Assessment:

In-stream:	Reduce or eliminate biotic potential
Stream-side:	Reduce or eliminate biotic potential

See SMP, Appendix E, Bank Protection Assessment Matrix for assessment details.

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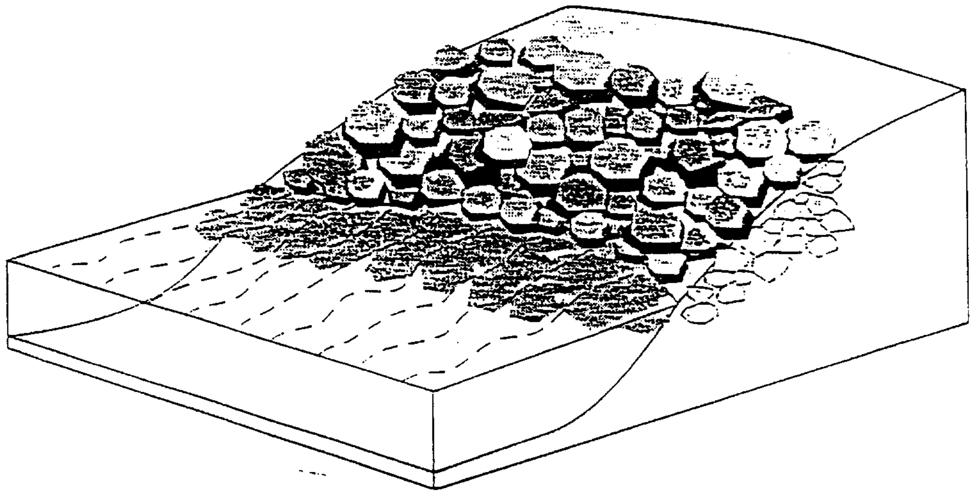
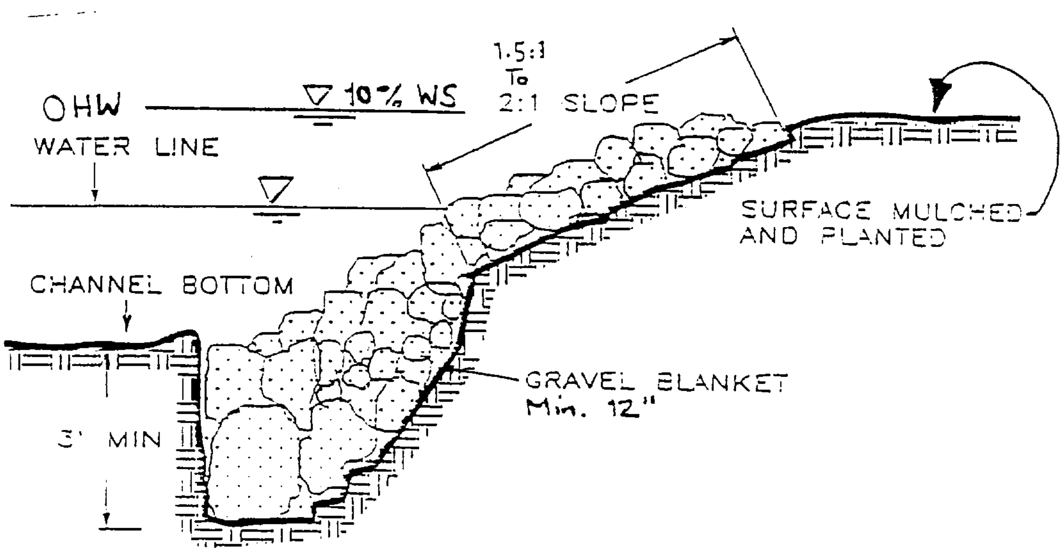
[1] Source: Natural Resources Conservation Service, Stream Corridor Restoration Principles, Processes and Practices

Bank Protection Measures

#8: Rock Blanket



Source: Natural Resources Conservation Service. Stream Corridor Restoration Principles, Processes and Practices



Source: California Department of Fish and Game. California Salmonid Stream Habitat Restoration Manual

Bank Protection Measures

#8A: Boulder Revetment

Description:

Boulder rip-rap is a method for armoring stream banks with large boulders for preventing bank erosion. Rip-rap footing is laid in a "toe" trench dug along the base of the bank. Large boulders (min. 24") are then laid on the bank slopes up to the design water surface level (ordinary high water or other design water surface). Large angular boulders are best suited for this purpose. Boulder rip-rap can provide protection in areas where log or boulder instream structures may lead to bank erosion. The boulders used should be dense and structurally competent[1].

A gravel blanket that is at least 1 foot thick should be placed under the boulder rip-rap on slopes of 1:1 or greater. This is to prevent underlying soil from being washed out and causing slope slump and possible failure during periods of high flow. Geotextile fabrics should be avoided, as they prevent the natural establishment of vegetation[1].

This method should, where appropriate, be used with soil bio-engineering systems or live vegetation to stabilize the upper bank and ensure a regenerative source of streambank vegetation. A major benefit of this method is that the components are flexible and function is not impaired by slight movement from settlement or other adjustments[2].

This structure would allow for some natural revegetation of the bank.

Design Criteria:

Appropriate for slopes up to 1 to 1, preferably 2 to 1.

Appropriate for velocities up to 6 feet per second if boulder joints are planted. 15 feet per second if boulders are not planted.

Habitat Impact Assessment:

In-stream:	Provides limited biotic resources
Stream-side:	Provides limited biotic resources

See SMP, Appendix E, Bank Protection Assessment Matrix for assessment details.

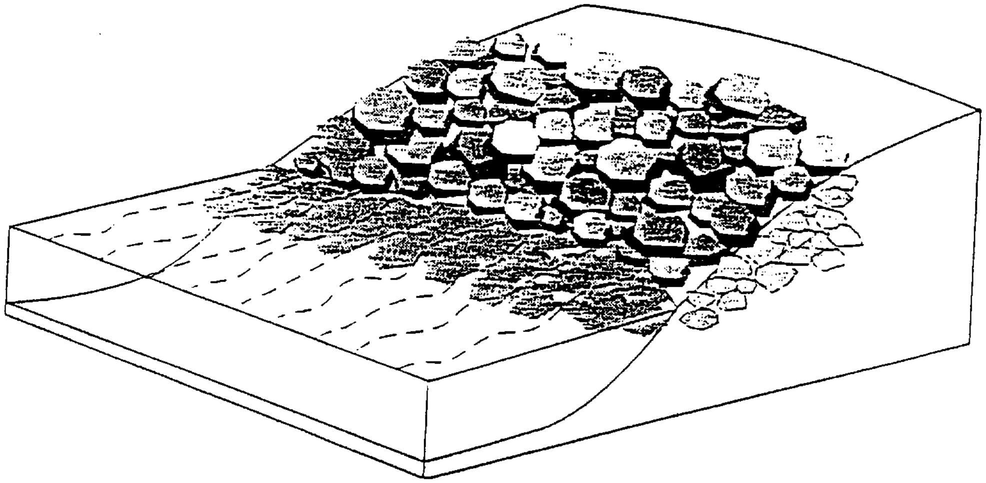
---

[1] Source: California Department of Fish and Game. California Salmonid Stream Habitat Restoration Manual

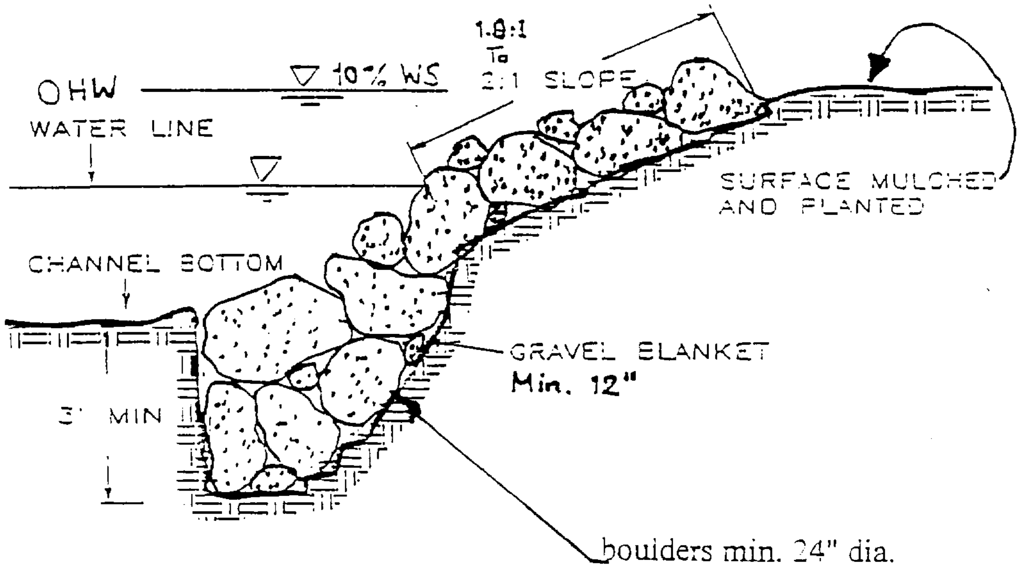
[2] Source: Natural Resources Conservation Service. Stream Corridor Restoration Principles. Processes and Practices

Bank Protection Measures

#8A: Boulder Revetment



Source: Natural Resources Conservation Service. Stream Corridor Restoration Principles, Processes and Practices



Source: California Department of Fish and Game. California Salmonid Stream Habitat Restoration Manual

Bank Protection Measures

#8B: Boulder Revetment with Soil and Revegetation

Description:

Boulder rip-rap is a method for armoring stream banks with large boulders for preventing bank erosion. Rip-rap footing is laid in a "toe" trench dug along the base of the bank. Large boulders (min. 24") are then laid on the bank slopes up to the ordinary high water or other design water surface. Large angular boulders are best suited for this purpose. Boulder rip-rap can provide protection in areas where log or boulder instream structures may lead to bank erosion. The boulders used should be dense and structurally competent[1].

Soil is placed over the boulders and vegetation is installed by staking and/or direct seeding. Biodegradable erosion control mats are placed over the soil to help control erosion until vegetation establishes itself. Special care must be taken in staking to avoid damage to the stakes' cambium and to ensure good soil/water/stake contact. Thick rip-rap layers may require special tools for establishing staking pilot holes[2].

A gravel blanket that is at least 1 foot thick should be placed under the boulder rip-rap on slopes of 1:1 or greater. This is to prevent underlying soil from being washed out and causing slope slump and possible failure during periods of high flow. Geotextile fabrics should be avoided, as they prevent the natural establishment of vegetation[1].

This method should, where appropriate, be used with soil bio-engineering systems or live vegetation to stabilize the upper bank and ensure a regenerative source of streambank vegetation. A major benefit of this method is that the components are flexible and function is not impaired by slight movement from settlement or other adjustments[2].

Design Criteria:

Appropriate for slopes up to 1 to 1, preferably 2 to 1.
Appropriate for velocities up to 6 feet per second.

Habitat Impact Assessment:

In-stream: Enhances biotic resources
Stream-side: Provides limited biotic resources

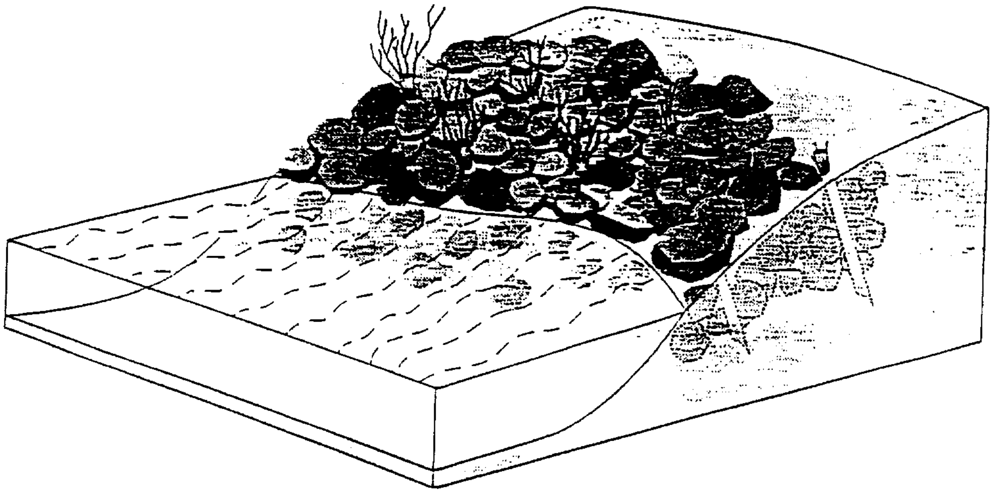
See SMP, Appendix E, Bank Protection Assessment Matrix for assessment details.

[1] Source: California Department of Fish and Game. California Salmonid Stream Habitat Restoration Manual

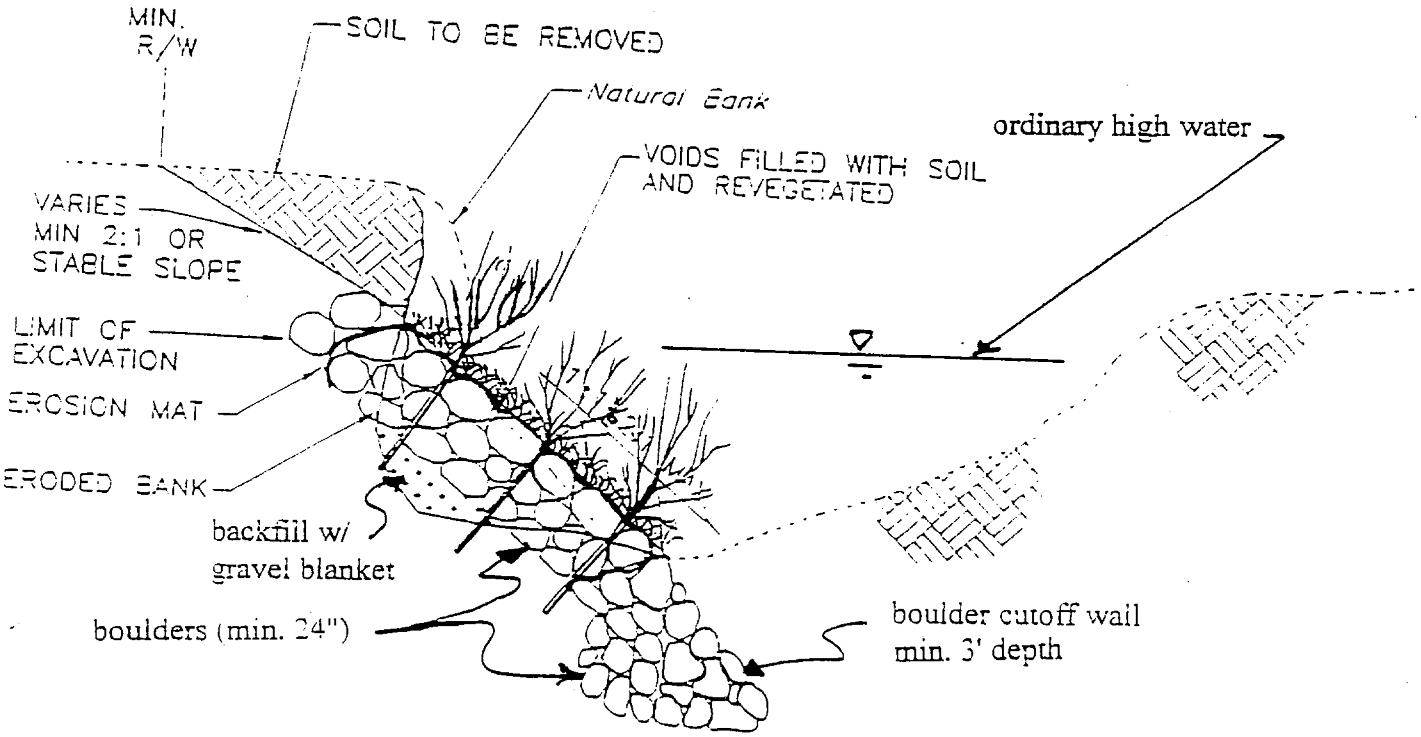
[2] Source: Natural Resources Conservation Service. Stream Corridor Restoration Principles, Processes and Practices

Bank Protection Measures

#8B: Boulder Revetment with Soil and Revegetation



Source: Natural Resources Conservation Service. Stream Corridor Restoration Principles. Processes and Practices


MIN. R/W
SOIL TO BE REMOVED
Natural Bank
ordinary high water
VOIDS FILLED WITH SOIL AND REVEGETATED
VARIES MIN 2:1 OR STABLE SLOPE
LIMIT OF EXCAVATION
EROSION MAT
ERODED BANK
backfill w/ gravel blanket
boulders (min. 24")
boulder cutoff wall min. 3' depth

Section

Bank Protection Measures

#8C: Boulder Revetment with Soil and Revegetation, and Vortex Weir

Description:

Boulder rip-rap is a method for armoring stream banks with large boulders for preventing bank erosion. Rip-rap footing is laid in a "toe" trench dug along the base of the bank. Large boulders (min. 24") are then laid on the bank slopes up to the design water surface level (ordinary high water or other design water surface). Large angular boulders are best suited for this purpose. Boulder rip-rap can provide protection in areas where log or boulder instream structures may lead to bank erosion. The boulders used should be dense and structurally competent[1].

Soil is placed over the boulders and vegetation is installed by staking and/or direct seeding. Biodegradable erosion control mats are placed over the soil to help control erosion until vegetation establishes itself. Special care must be taken in staking to avoid damage to the stakes' cambium and to ensure good soil/water/stake contact. Thick rip-rap layers may require special tools for establishing staking pilot holes[2].

A gravel blanket that is at least 1 foot thick should be placed under the boulder rip-rap on slopes of 1:1 or greater. This is to prevent underlying soil from being washed out and causing slope slump and possible failure during periods of high flow. Geotextile fabrics should be avoided, as they prevent the natural establishment of vegetation[1].

Vortex boulder weirs were designed for use in high bedload streams to maintain sediment transport capacity, maintain low width to depth ratios, and provide habitat. Vortex boulder weirs provide instream cover and deepen feeding areas in riffle habitat, provide a wide range of velocities for salmonid holding water at high flows, act as grade control structures without upstream lateral migration, bank erosion, or aggradation, and maintain a low width/depth ratio to reduce sediment deposition[1]. Weirs should be placed on downstream side of bank repair to protect profile.

This method should, where appropriate, be used with soil bio-engineering systems or live vegetation to stabilize the upper bank and ensure a regenerative source of streambank vegetation. A major benefit of this method is that the components are flexible and function is not impaired by slight movement from settlement or other adjustments[2].

Design Criteria:

Appropriate for slopes up to 1 to 1, preferably 2 to 1.
Appropriate for velocities up to 6 feet per second.

Habitat Impact Assessment:

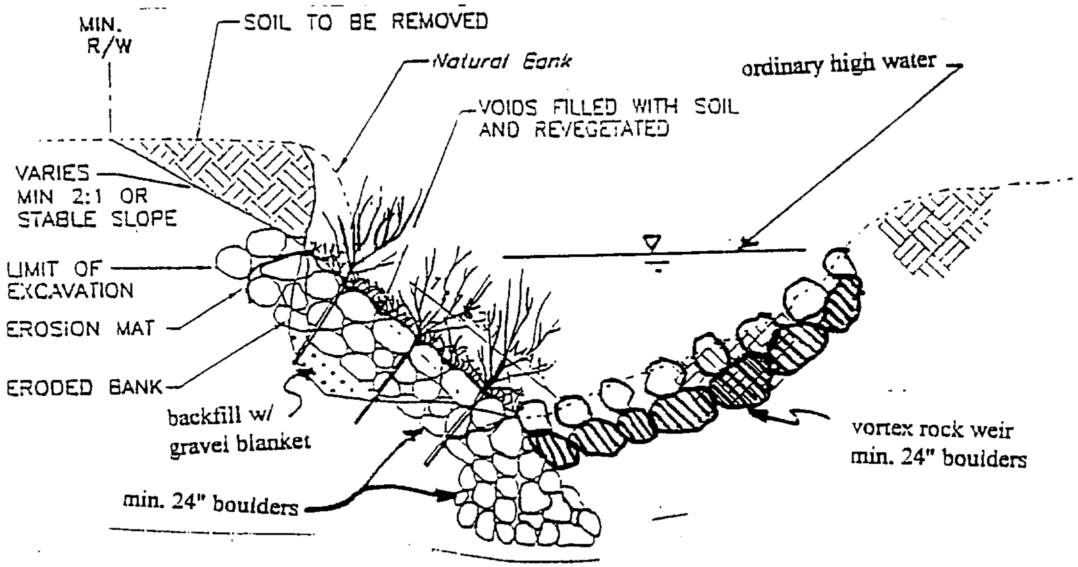
In-stream:	Enhances biotic resources
Stream-side:	Provides limited biotic resources

See SMP, Appendix E, Bank Protection Assessment Matrix for assessment details.

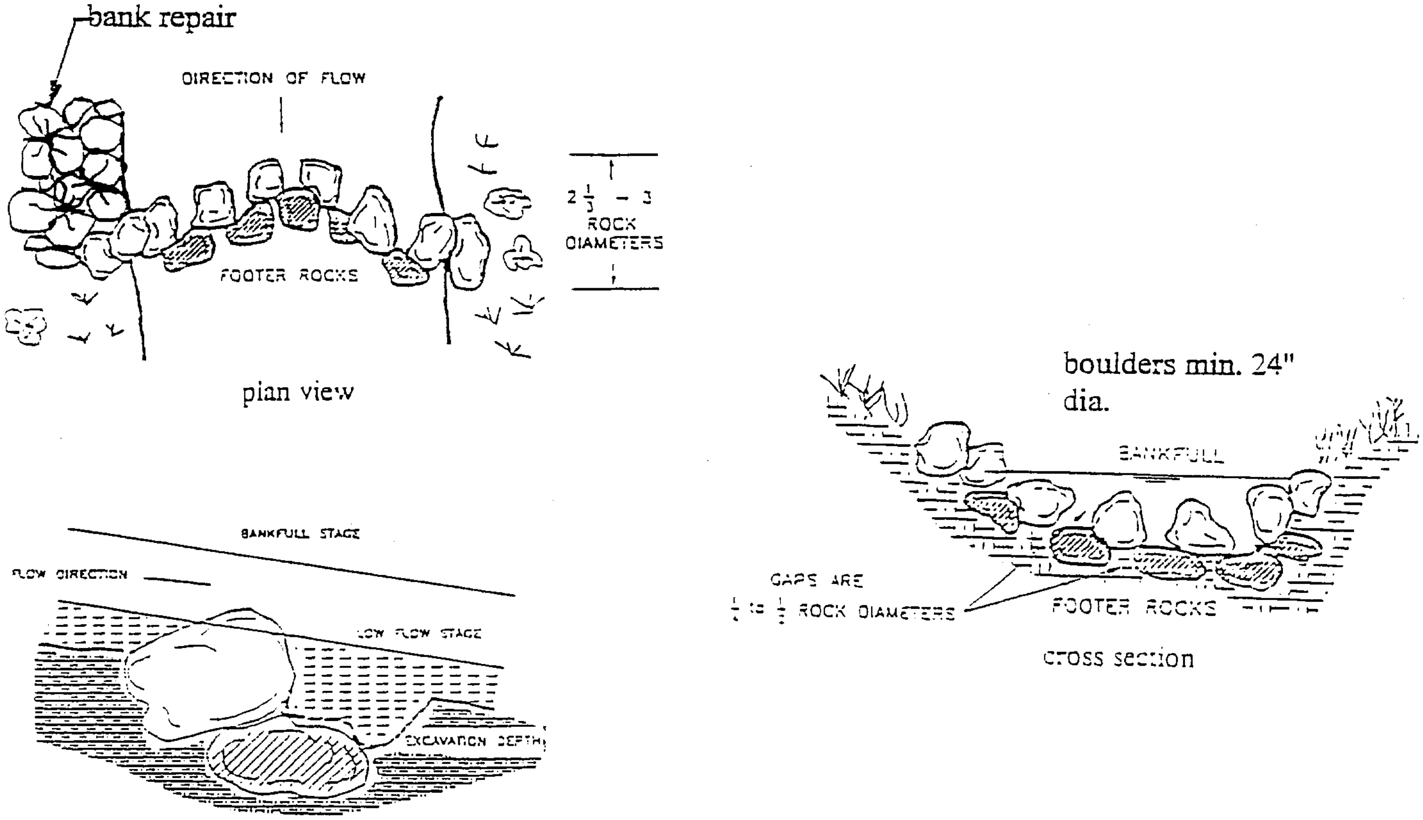
[1] Source: California Department of Fish and Game, California Salmonid Stream Habitat Restoration Manual
[2] Source: Natural Resources Conservation Service, Stream Corridor Restoration Principles, Processes and Practices

Bank Protection Measures

#8C: Boulder Rip-Rap, with Soil and Revegetation, and Vortex Weir


MIN. R/W
SOIL TO BE REMOVED
Natural Bank
ordinary high water
VOIDS FILLED WITH SOIL AND REVEGETATED
VARIES MIN 2:1 OR STABLE SLOPE
LIMIT OF EXCAVATION
EROSION MAT
ERODED BANK
backfill w/ gravel blanket
min. 24" boulders
vortex rock weir min. 24" boulders

Section



plan view

cross section

profile view

Vortex Weirs: Plan. Section. and Profile

Source: California Department of Fish and Game. California Salmonid Stream Habitat Restoration Manual

Bank Protection Measures

#9: Stepped Gabions

Description:

This method consists of large wire baskets filled with rocks and placed on channel banks as mattresses or stacked in layers that resemble steps. The slope protection is extended until the ordinary high water surface level is reached. A rock cutoff wall is required if channel invert protection is not provided to prevent undermining the structure. Gabions can sometimes naturally revegetate, if adequate water and soil are available.

Design Criteria:

Appropriate for bank slopes from 0.75 to1 up to 3 to 1.

Appropriate for velocities up to 15 feet per second.

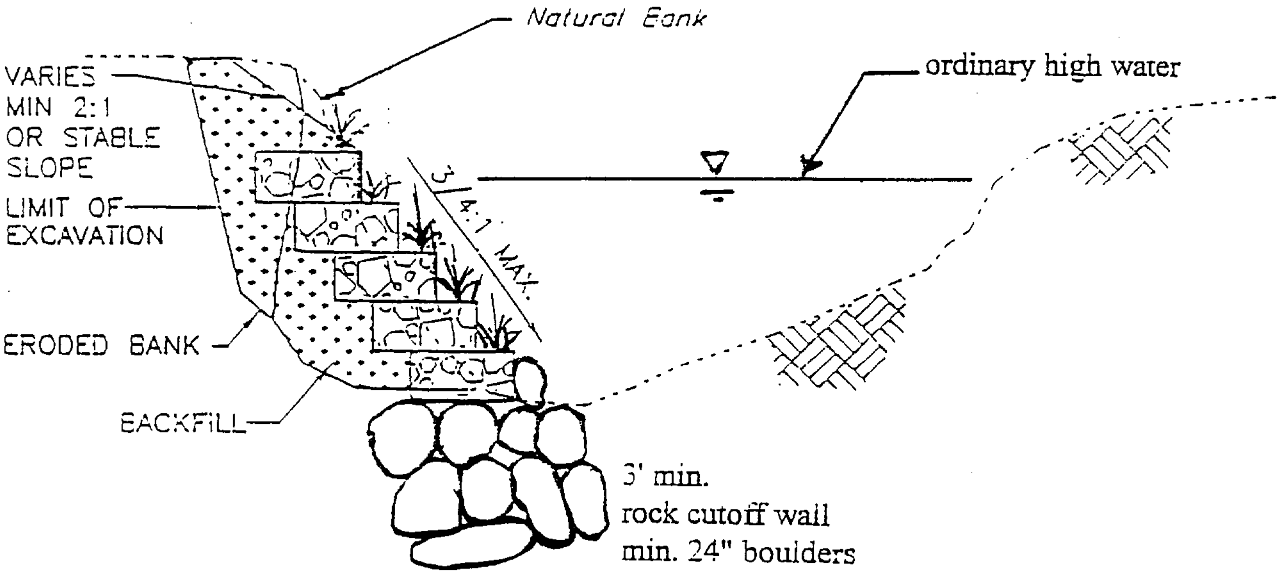
Habitat Impact Assessment:

In-stream:	Provide limited biotic resources
Stream-side:	Reduce or eliminate biotic potential

See SMP, Appendix E, Bank Protection Assessment Matrix for assessment details.

Bank Protection Measures

#9: Stepped Gabions



Section

Bank Protection Measures

#9A: Stepped Gabions with Planting Areas

Description:

This method consists of large wire baskets filled with rocks and placed on channel banks stacked in layers that resemble steps. The layers are stacked, one on top of the other, until the ordinary high water surface level is reached. A rock cutoff wall is required if channel invert protection is not provided to prevent undermining the structure.

Gabions are revegetated using planting boxes. Planting boxes are gabion cells that are left open to bare soil and revegetated with shrubs and trees. Irrigation is provided to the planted vegetation to aid plant establishment. The gabion baskets themselves can sometimes naturally revegetate, if adequate water and soil are available.

Design Criteria:

Appropriate for slopes from 0.75 to1 up to 3 to 1.

Appropriate for velocities up to 6 feet per second.

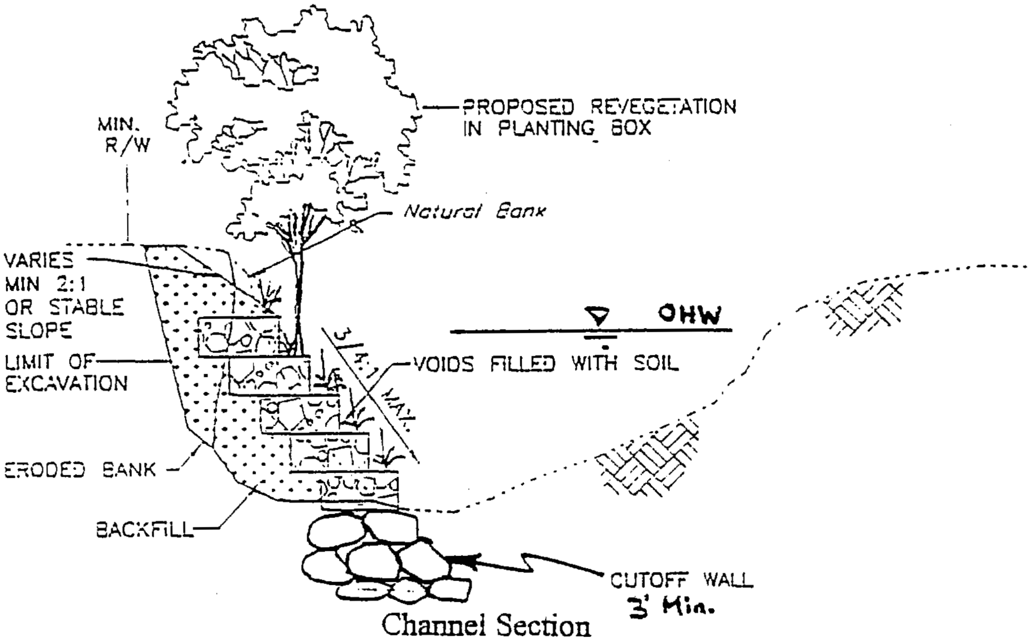
Habitat Impact Assessment:

In-stream:	Provides limited biotic resources
Stream-side:	Reduces or eliminates biotic potential

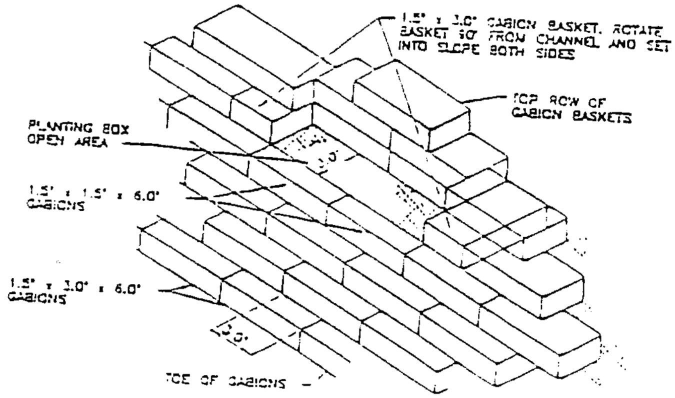
See SMP, Appendix E, Bank Protection Assessment Matrix for assessment details.

Bank Protection Measures

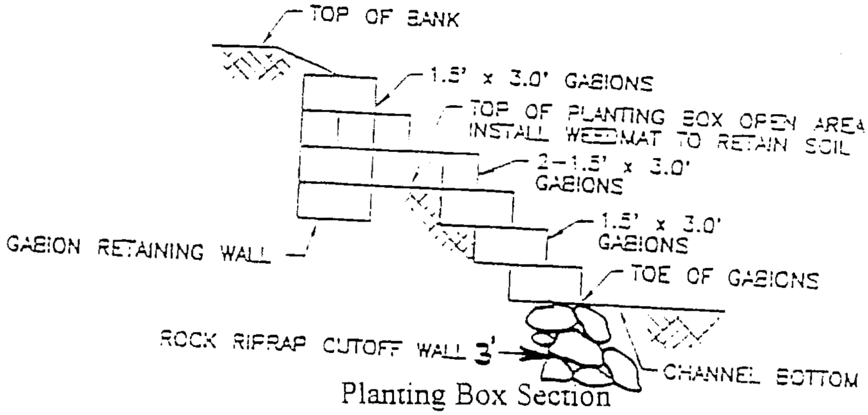
#9A: Stepped Gabions with Planting Areas



Channel Section


1.5' x 3.0' GABION BASKET. ROTATE BASKET 90° FROM CHANNEL AND SET INTO SLOPE BOTH SIDES
TOP ROW OF GABION BASKETS
PLANTING BOX OPEN AREA
3.0'
1.5' x 1.5' x 6.0' GABIONS
1.5' x 3.0' x 6.0' GABIONS
3.0'
TOE OF GABIONS

Planting Box Detail



Planting Box Section

#9B: Stepped Gabions
with Planting Areas and Vortex Rock Weirs

Description:

This method consists of large wire baskets filled with rocks and placed on channel banks stacked in layers that resemble steps. The layers are stacked, one on top of the other, until the design water surface (ordinary high water or other) is reached. A concrete, gabion, or rock cutoff wall is required if channel invert protection is not provided to prevent undermining the structure.

Gabions can be revegetated using planting boxes. Planting boxes are gabion cells that are left open to bare soil and revegetated with shrubs and trees. Irrigation is provided to the planted vegetation to aid plant establishment. The unplanted gabions can sometimes naturally revegetate, if adequate water and soil are available.

Vortex boulder weirs were designed for use in high bedload streams to maintain sediment transport capacity, maintain low width to depth ratios, and provide habitat. Vortex boulder weirs provide instream cover and deepen feeding areas in riffle habitat, provide a wide range of velocities for salmonid holding water at high flows, act as grade control structures without upstream lateral migration, bank erosion, or aggradation, and maintain a low width/depth ratio to reduce sediment deposition[1]. Weirs should be placed on the downstream end of erosion protection structure to help maintain profile.

Design Criteria:

Appropriate for bank slopes from 0.75 to1 up to 3 to 1.

Appropriate for velocities up to 6 feet per second.

Vortex weirs are most appropriate in "F" and "B" type channels, according to Rosgen's stream classification system[1].

Habitat Impact Assessment:

In-stream:	Provides limited biotic potential
Stream-side:	Reduces or eliminates biotic potential

See SMP, Appendix E, Bank Protection Assessment Matrix for assessment details.

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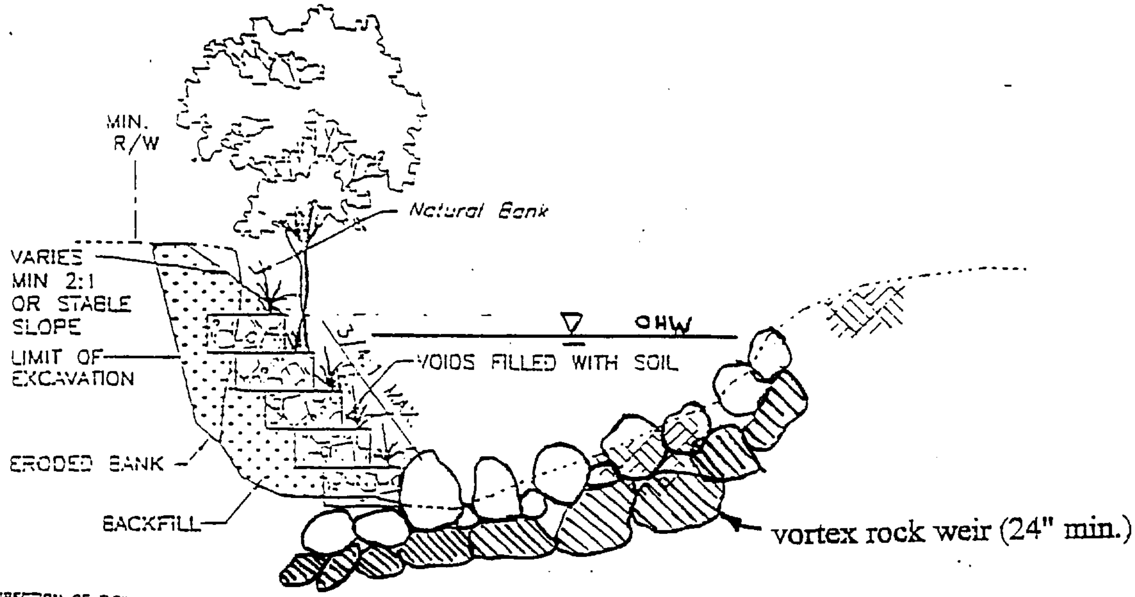
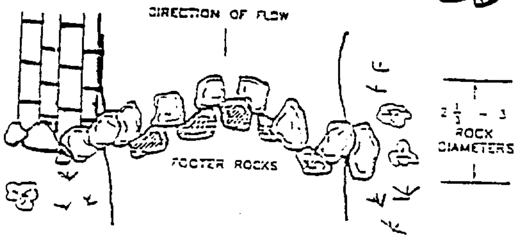
[1] Source: California Department of Fish and Game, California Salmonid Stream Habitat Restoration Manual

Bank Protection Measures

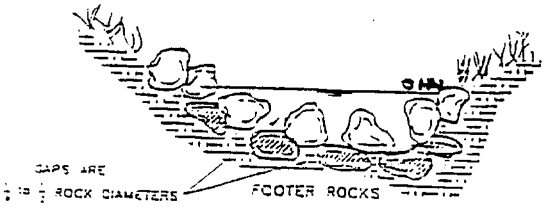
#9B: Stepped Gabions with Planting Areas and Vortex Rock Weirs



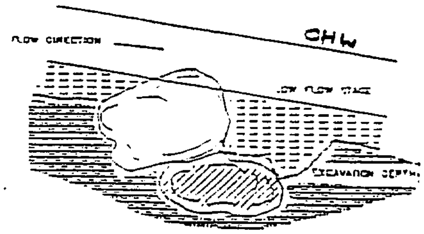
Channel Section



plan view

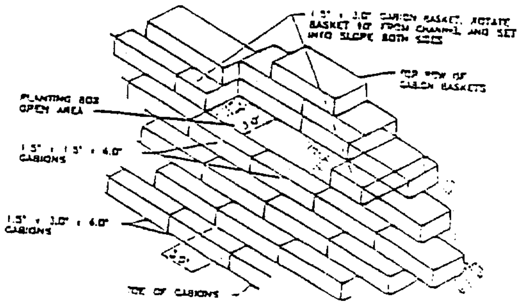


cross section

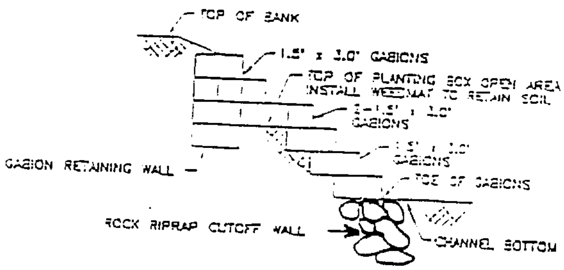


profile view

Vortex Weirs: Plan, Section, and Profile


1.5' x 3.0' GABION BASKET, ROTATE BASKET 90° FROM CHANNEL AND SET INTO SLOPE BOTH SIDES
TOP ROW OF GABION BASKETS
PLANTING BOX OPEN AREA
3.0'
1.5' x 1.5' x 6.0' GABIONS
1.5' x 3.0' x 6.0' GABIONS
TOE OF GABIONS

Planting Box Detail



Planting Box Section

Source: Adapted from California Department of Fish and Game. California Salmonid Stream Habitat Restoration Manual

Bank Protection Measures

#10: Articulated Concrete Blocks

Description:

Articulated concrete blocks (ACB) consists of concrete interlocking blocks that are cabled together to form mats that can be laid on the channel slope and/or channel bottom. The ACB is extended below the invert to form a cutoff wall.

ACBs are available in two styles: open cell and closed cell. The open cell style allows for vegetation to be recruited into the soil filling of the cell. Vegetation growth is restricted by the sizes of the cell openings and by the disconnection caused by the cell walls.

Design Criteria:

Appropriate for slopes up to 1 to 1.

Appropriate for velocities up to 15 feet per second for closed cell ACBs, 6 feet per second for open cell ACBs.

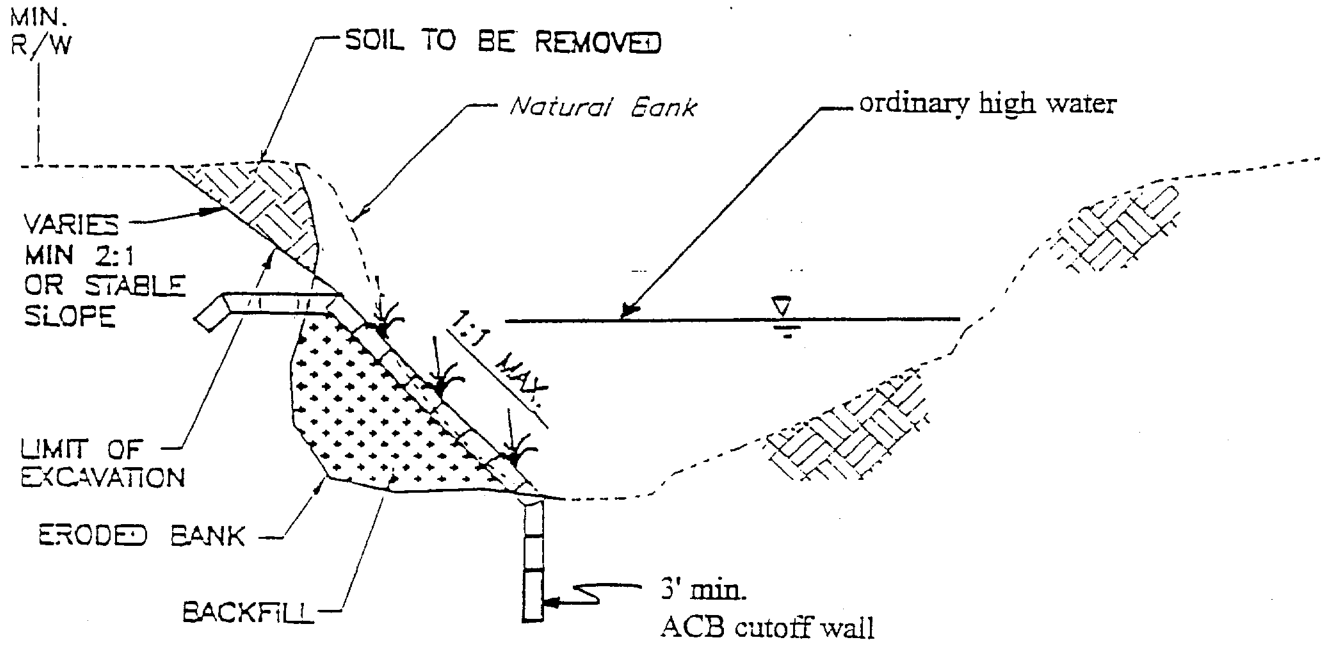
Habitat Impact Assessment:

In-stream:	Provide limited biotic resources
Stream-side:	Reduce or eliminate biotic potential

See SMP, Appendix E, Bank Protection Assessment Matrix for assessment details.

Bank Protection Measures

#10: Articulated Concrete Blocks



Section

Bank Protection Measures

#10A: Articulated Concrete Blocks with Planting Areas

Description:

Articulated concrete blocks (ACB) consists of concrete interlocking blocks that are cabled together to form mats that can be laid on the channel slope and/or channel bottom. The ACB is extended below invert as a cutoff wall to prevent undermining of slope protection.

ACBs are available in two styles: open cell and closed cell. The open cell style allows for vegetation to be recruited into the soil filling of the cell. Vegetation growth is restricted by the sizes of the cell openings and by the disconnection caused by the cell walls.

Open planting areas can be constructed into the ACB mats by creating an opening in the mat by removing some of the blocks. The open areas can be revegetated with shrubs and trees. Irrigation is provided to the planted vegetation to aid plant establishment.

Design Criteria:

Appropriate for slopes up to 1 to 1.

Appropriate for velocities up to 15 feet per second for closed cell ACBs, 6 feet per second for open cell ACBs.

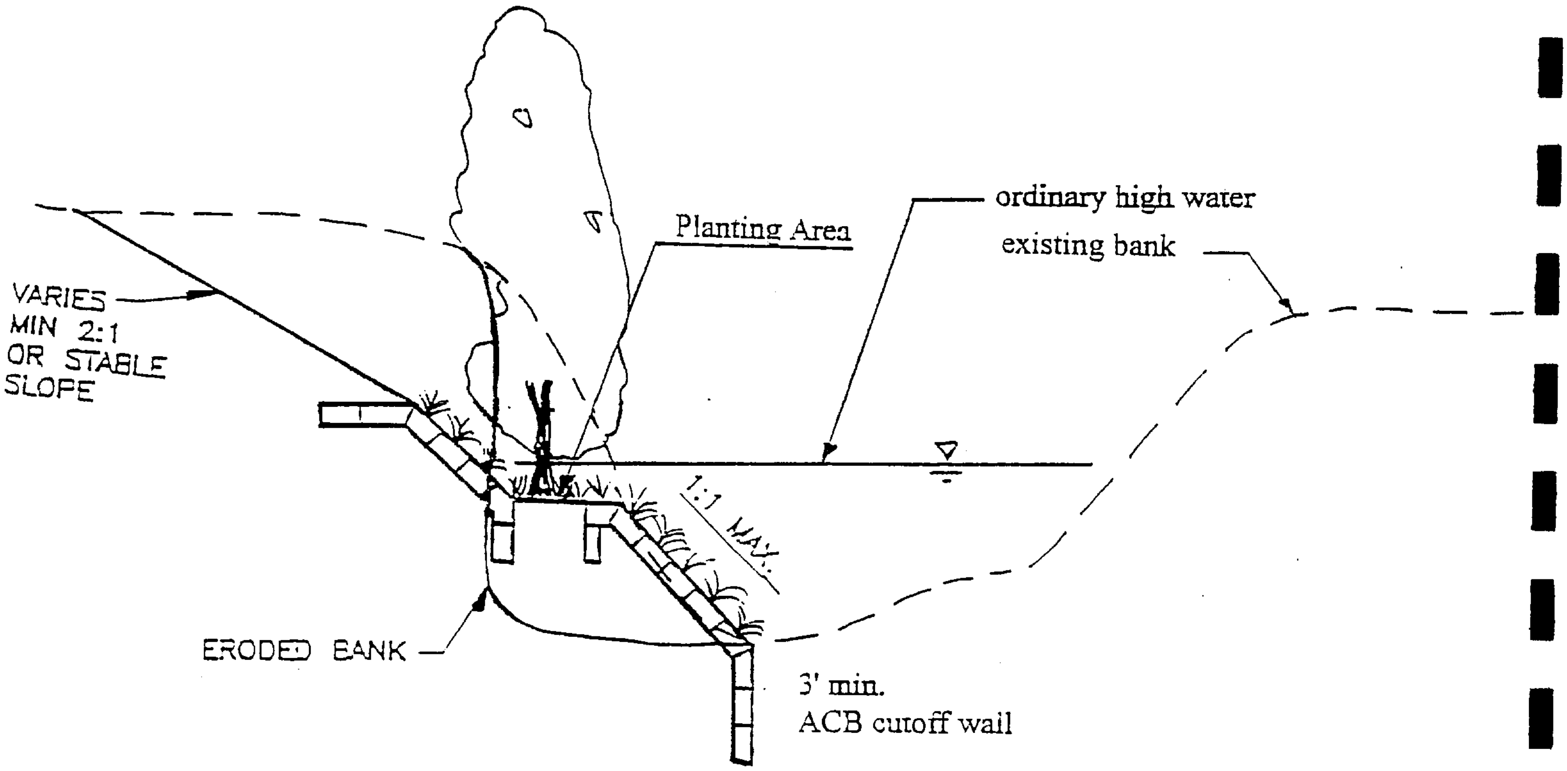
Habitat Impact Assessment:

In-stream:	Provides limited biotic resources
Stream-side:	Reduces or eliminates biotic potential

See SMP, Appendix E, Bank Protection Assessment Matrix for assessment details.

Bank Protection Measures

#10A: Articulated Concrete Blocks with Planting Areas



Section

Bank Protection Measures

#10B: Articulated Concrete Blocks with Planting Areas and Vortex Rock Weirs

Description:

Articulated concrete blocks (ACB) consists of concrete interlocking blocks that are cabled together to form mats that can be laid on the channel slope and/or channel bottom. The ACB is extended below invert as a cutoff wall to prevent undermining of slope protection.

ACBs are available in two styles: open cell and closed cell. The open cell style allows for vegetation to be recruited into the soil filling of the cell. Vegetation growth is restricted by the sizes of the cell openings and by the disconnection caused by the cell walls.

Open planting areas can be constructed into the ACB mats by creating an opening in the mat by removing some of the blocks. The open areas can be revegetated with shrubs and trees. Irrigation is provided to the planted vegetation to aid plant establishment.

Vortex boulder weirs were designed for use in high bedload streams to maintain sediment transport capacity, maintain low width to depth ratios, and provide habitat. Vortex boulder weirs provide instream cover and deepen feeding areas in riffle habitat, provide a wide range of velocities for salmonid holding water at high flows, act as grade control structures without upstream lateral migration, bank erosion, or aggradation, and maintain a low width/depth ratio to reduce sediment deposition[1]. Weirs are built on the downstream end of bank repair project to help control profile.

Design Criteria:

Appropriate for slopes up to 1 to 1.
Appropriate for velocities up to 15 feet per second for closed cell ACBs, 6 feet per second for open cell ACBs.
Vortex weirs are most appropriate in "F" and "B" type channels, according to Rosgen's stream classification system[1].

Habitat Impact Assessment:

In-stream:	Provides limited biotic resources
Stream-side:	Provides limited biotic resources

See SMP, Appendix E, Bank Protection Assessment Matrix for assessment details.

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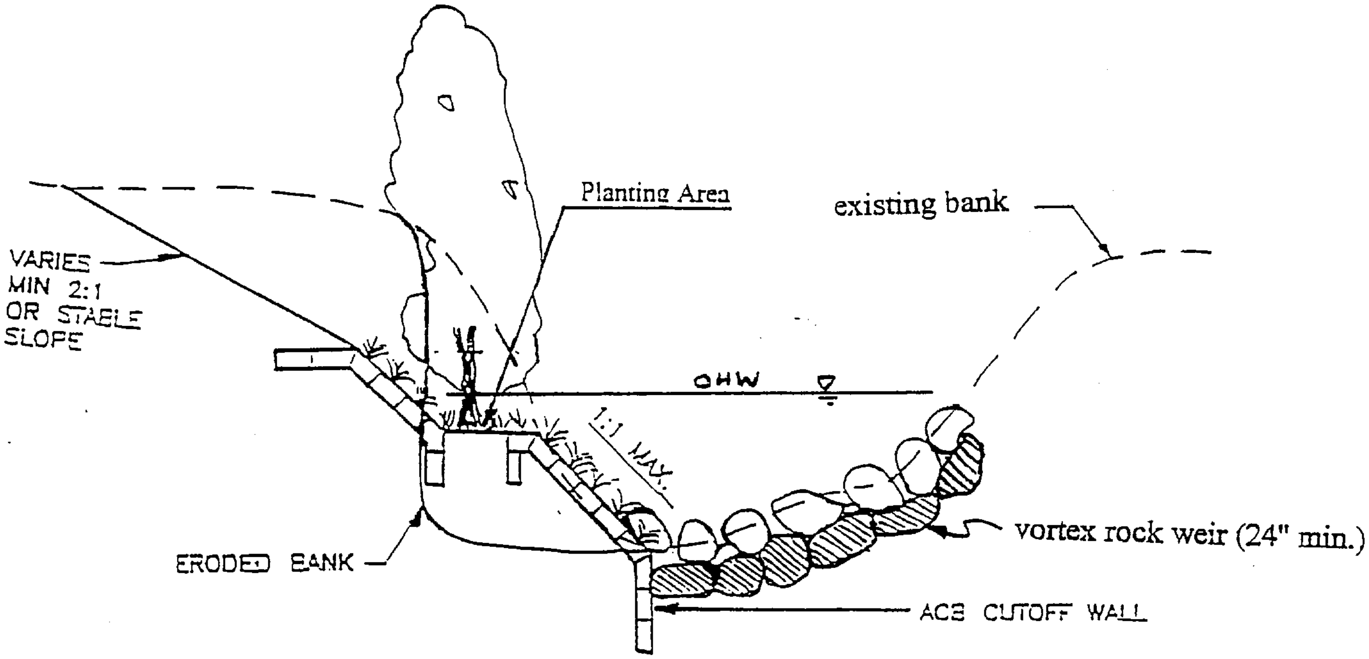
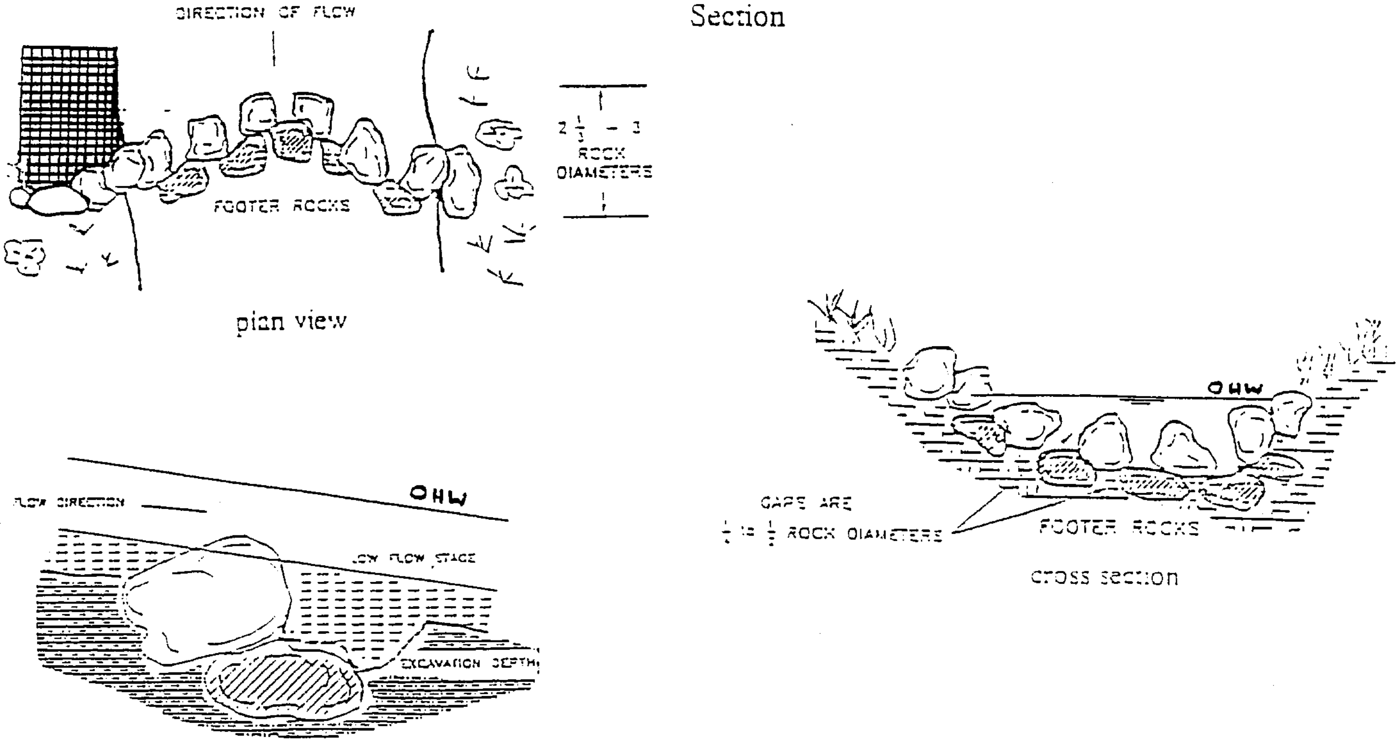
[1] Source: California Department of Fish and Game, California Salmonid Stream Habitat Restoration Manual

Bank Protection Measures

#10B: Articulated Concrete Blocks with Planting Areas and Vortex Rock Weirs



Section



plan view

cross section

profile view

Vortex Weirs: Plan, Section, and Profile

Source: Adapted from California Department of Fish and Game, California Salmonid Stream Habitat Restoration Manual

Bank Protection Measures

#11: Concrete Crib Walls

Description:

Concrete crib walls consist of stacked interlocking concrete frames that form a retaining wall. The structural strength is developed by the composite design of a concrete frame with compacted backfill. Crib walls are constructed with open face panels that are planted by live staking. This method restricts plant growth by the size of the panel opening. As the crib wall slope is flattened and the lattice becomes more open, the vegetation potential increases and the allowable velocity decreases because of the exposed soil and vegetation.

Design Criteria:

Appropriate for slopes up to 1/4 to 1.

Appropriate for velocities from 6 feet per second up to 15 feet per second, depending on the size of the crib wall's openings.

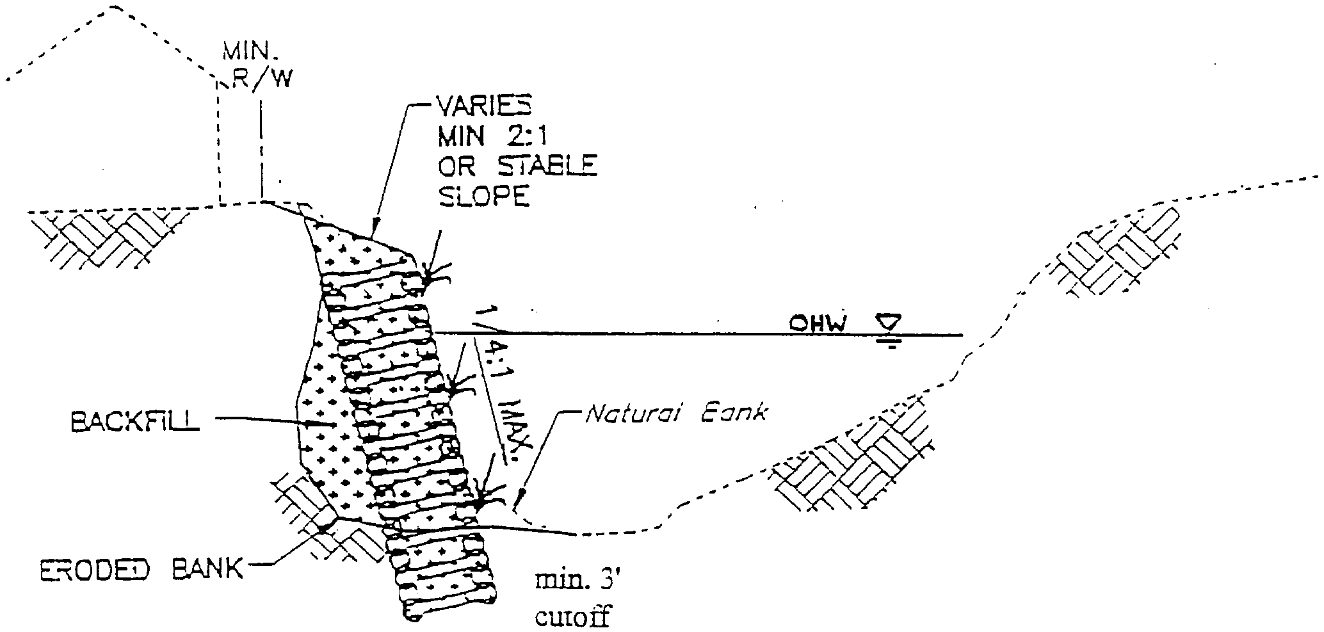
Habitat Impact Assessment:

In-stream:	Reduces or eliminates biotic potential
Stream-side:	Reduces or eliminates biotic potential

See SMP, Appendix E, Bank Protection Assessment Matrix for assessment details.

Bank Protection Measures

#11: Concrete Crib Walls



Section

Bank Protection Measures

#11A: Concrete Crib Walls with Vortex Rock Weirs

Description:

Concrete crib walls consist of stacked interlocking concrete frames that form a retaining wall. The structural strength is developed by the composite design of a concrete frame with compacted backfill. Crib walls are constructed with open face panels that are planted by live staking. This method restricts plant growth by the size of the panel opening. As the crib wall slope is flattened and the lattice becomes more open, the vegetation potential increases and the allowable velocity decreases because of the exposed soil and vegetation.

Vortex boulder weirs were designed for use in high bedload streams to maintain sediment transport capacity, maintain low width to depth ratios, and provide habitat. Vortex boulder weirs provide instream cover and deepen feeding areas in riffle habitat, provide a wide range of velocities for salmonid holding water at high flows, act as grade control structures without upstream lateral migration, bank erosion, or aggradation, and maintain a low width/depth ratio to reduce sediment deposition[1]. Weirs are built on the downstream end of the bank repair project to help maintain profile.

Design Criteria:

Appropriate for slopes up to 1/4 to 1.

Appropriate for velocities from 6 feet per second up to 15 feet per second, depending on the size of the crib wall's openings.

Vortex weirs are most appropriate in "F" and "B" type channels, according to Rosgen's stream classification system[1].

Habitat Impact Assessment:

In-stream:	Provides limited biotic resources
Stream-side:	Reduces or eliminates biotic potential

See SMP, Appendix E, Bank Protection Assessment Matrix for assessment details.

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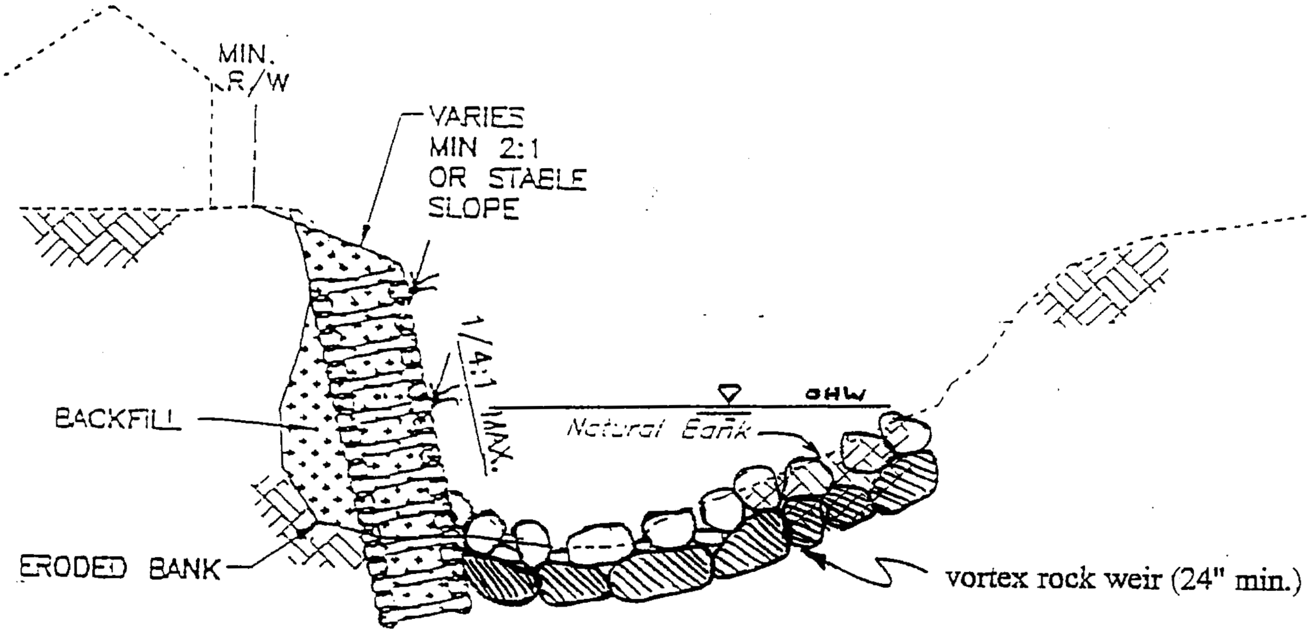
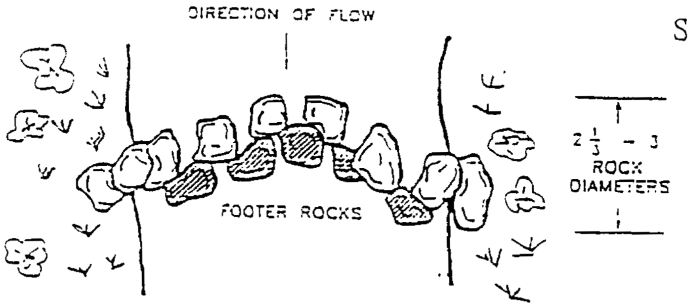
[1] Source: California Department of Fish and Game, California Salmonid Stream Habitat Restoration Manual

Bank Protection Measures

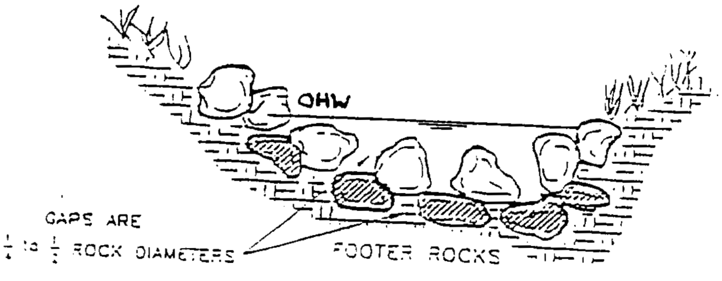
#11A: Concrete Crib Walls with Vortex Rock Weirs



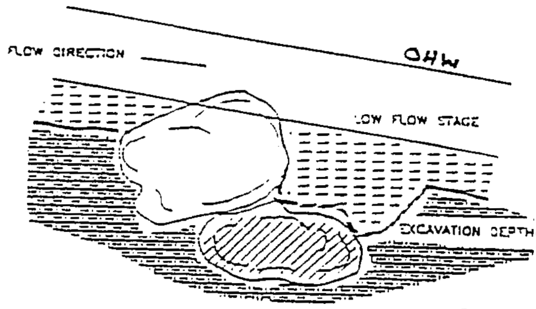
Section



plan view



cross section



profile view

Vortex Weirs: Plan. Section. and Profile

Source: California Department of Fish and Game. California Salmonid Stream Habitat Restoration Manual

Bank Protection Measures

#12: Live Log Crib Walls

Description:

Log crib walls are used to reduce sediment input and protect banks in areas where logs are available and boulders are not practical[1]. Cribbing provides protection in areas with near-vertical banks where bank sloping options are limited by issues such as right of way restrictions[2]. Cribwalls afford a natural appearance, immediate protection, and accelerate the establishment of woody species[2]. This method is effective on the outside of bends where high velocities are present and in situations where a low wall may be required to stabilize the toe and reduce slope steepness[2]. This method does not adjust to toe scour and should be used in combination with soil bioengineering systems and live plantings to stabilize the upper slopes[2]. Logs should be selected for soundness, durability, uniformity of size, and ease of handling (straight logs much preferred) and delivery.

Two rows of base logs are placed in trenches below stream grade to prevent undercutting of the structure. Base logs should be as large (long and thick) as can be manipulated while conforming to the contour of the stream bank. Good base logs are crucial to ensure stability and durability of the crib wall[1]. Geotextile fabric should be placed behind the structure. Tie-back logs are notched into the base logs and placed at regular intervals (6 to 8 feet typically) along the base logs. Tie-back logs are attached to both rows of base logs using re-bar or cables. There should be at least two tie-back logs connecting each pair of base logs. Once the first row of tie-back logs has been connected, a second set of face logs is placed on top of the tie-backs. These logs are placed approximately 6 inches back into the slope. This procedure is repeated until the desired level of bank protection is achieved. As each lift is constructed, the face logs and tie-backs are filled with a mix of gravel and cobbles to the top of the face log. It is not necessary to use topsoil in the fill material: but there should be sufficient fine grained material to insure vegetation growth. Live cuttings are then laid in to form a complete cover layer. These live branches should be long enough to have their butt ends in the soil behind the crib wall. The tips should stick out of the crib wall no more than a quarter of the cutting total length. The branches are then covered with the gravel/cobble mix to the top of the tie-backs, and the next layer is continued.

Design Criteria:

Appropriate for slopes up to 1/4 to 1.
Appropriate for velocities from 6 feet per second up to 12 feet per second, depending on opening size.

Habitat Impact Assessment:

In-stream:	Enhances biotic resources
Stream-side:	Enhances biotic resources

See SMP, Appendix E, Bank Protection Assessment Matrix for assessment details.

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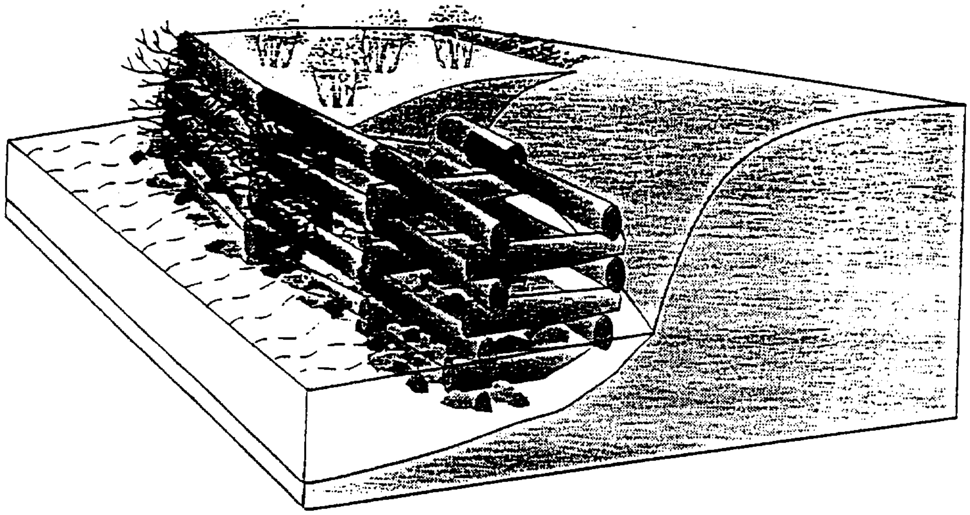
[1] Source: California Department of Fish and Game. California Salmonid Stream Habitat Restoration Manual

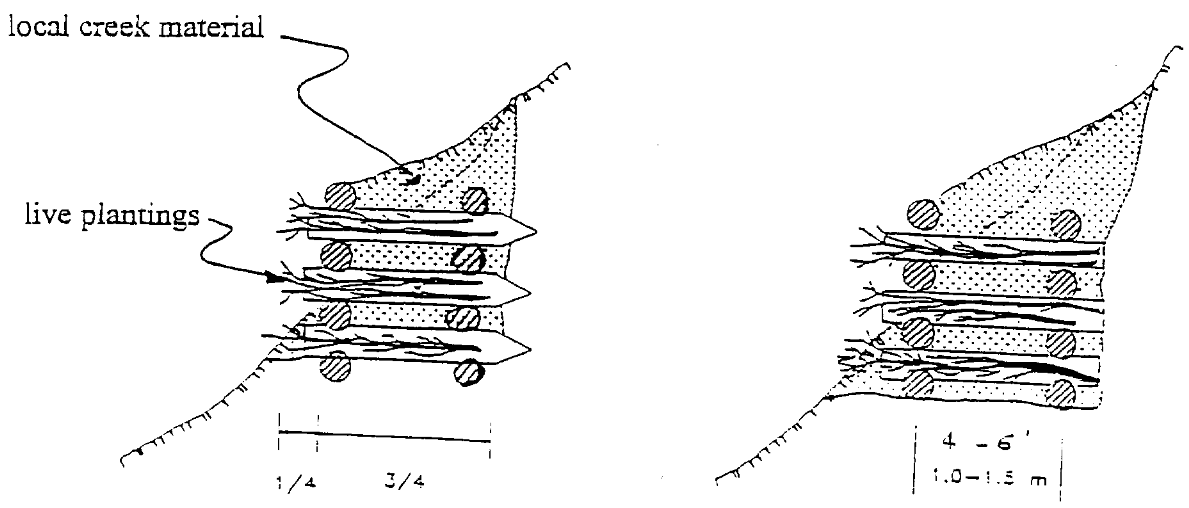
[2] Source: Natural Resources Conservation Service. Stream Corridor Restoration Principles. Processes and Practices

Bank Protection Measures

#12: Live Log Crib Walls



Source: Natural Resources Conservation Service. Stream Corridor Restoration Principles, Processes and Practices



Source: California Department of Fish and Game. California Salmonid Stream Habitat Restoration Manual

Bank Protection Measures

#12A: Live Log Crib Walls with Vortex Rock Weirs

Description:

Log crib walls are used to reduce sediment input and protect banks in areas where logs are available and boulders are not practical[1]. Cribbing provides protection in areas with near-vertical banks where bank sloping options are limited by issues such as right of way restrictions[2]. Cribwalls afford a natural appearance, immediate protection, and accelerate the establishment of woody species[2]. This method is effective on the outside of bends where high velocities are present and in situations where a low wall may be required to stabilize the toe and reduce slope steepness[2]. This method does not adjust to toe scour and should be used in combination with soil bioengineering systems and live plantings to stabilize the upper slopes[2]. Logs should be selected for soundness, durability, uniformity of size, and ease of handling (straight logs much preferred) and delivery.

Two rows of base logs are placed in trenches below stream grade to prevent undercutting of the structure. Base logs should be as large (long and thick) as can be manipulated while conforming to the contour of the stream bank. Good base logs are crucial to ensure stability and durability of the crib wall[1]. Geotextile fabric should be placed behind the structure. Tie-back logs are notched into the base logs and placed at regular intervals (6 to 8 feet typically) along the base logs. Tie-back logs are attached to both rows of base logs using re-bar or cables. There should be at least two tie-back logs connecting each pair of base logs. Once the first row of tie-back logs has been connected, a second set of face logs is placed on top of the tie-backs. These logs are placed approximately 6 inches back into the slope. This procedure is repeated until the desired level of bank protection is achieved. As each lift is constructed, the face logs and tie-backs are filled with a mix of gravel and cobbles to the top of the face log. It is not necessary to use topsoil in the fill material: but there should be sufficient fine grained material to insure vegetation growth. Live cuttings are then laid in to form a complete cover layer. These live branches should be long enough to have their butt ends in the soil behind the crib wall. The tips should stick out of the crib wall no more than a quarter of the cutting total length. The branches are then covered with the gravel/cobble mix to the top of the tie-backs, and the next layer is continued.

Vortex boulder weirs were designed for use in high bedload streams to maintain sediment transport capacity, maintain low width to depth ratios, and provide habitat. Vortex boulder weirs provide instream cover and deepen feeding areas in riffle habitat, provide a wide range of velocities for salmonid holding water at high flows, act as grade control structures without upstream lateral migration, bank erosion, or aggradation, and maintain a low width/depth ratio to reduce sediment deposition[1].

Design Criteria:

Appropriate for slopes up to 1/4 to 1. Appropriate for velocities from 6 feet per second up to 12 feet per second, depending on opening size. Vortex weirs are most appropriate in "F" and "B" type channels, according to Rosgen's stream classification system[1].

Habitat Impact Assessment:

In-stream: Enhances biotic resources
Stream-side: Enhances biotic resources
See SMP, Appendix E, Bank Protection Assessment Matrix for assessment details.

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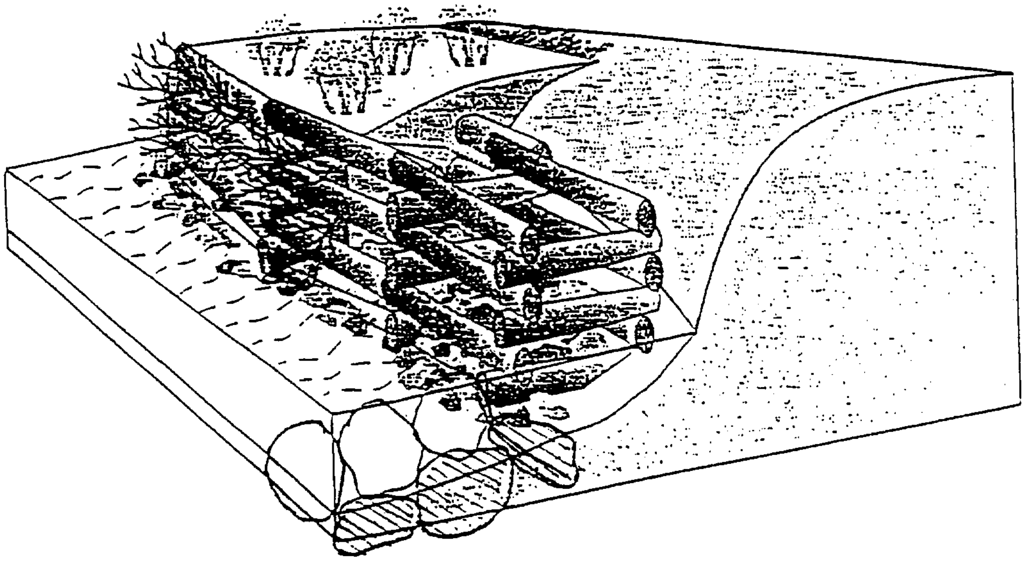
[1] Source: California Department of Fish and Game, California Salmonid Stream Habitat Restoration Manual

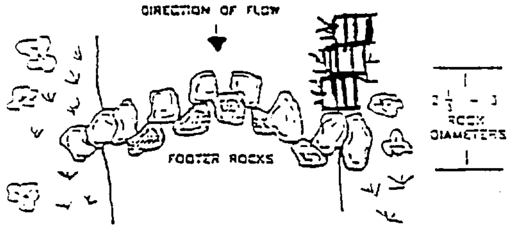
[2] Source: Natural Resources Conservation Service, Stream Corridor Restoration Principles, Processes and Practices

Bank Protection Measures

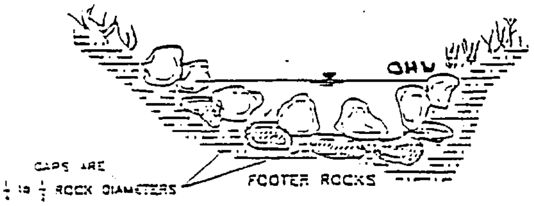
#12A: Live Log Crib Walls with Vortex Rock Weirs



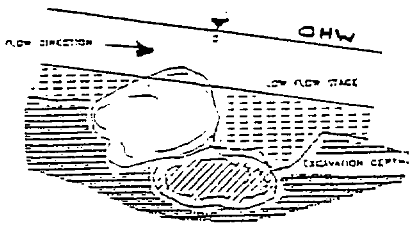
Source: Natural Resources Conservation Service. Stream Corridor Restoration Principles, Processes and Practices



plan view

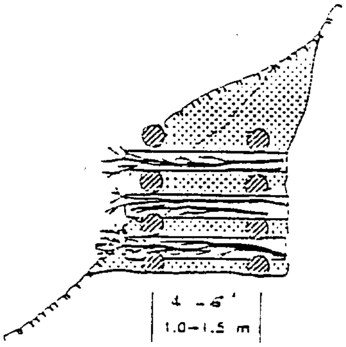


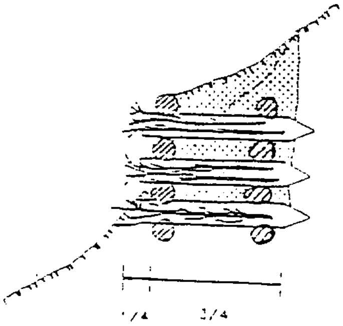
cross section



profile view

Vortex Weirs: Plan, Section, and Profile





Source: California Department of Fish and Game. California Salmonid Stream Habitat Restoration Manual

Bank Protection Measures
#13: Sacked Concrete

Description:

Sacked concrete slope protection (SCSP) consists of burlap bags filled with concrete and placed against channel banks. SCSP requires a concrete or SCSP cutoff wall at the toe of the slope to prevent failure. SCSP does not provide any revegetation potential. However, it offers the opportunity to contour walls such that existing vegetation is avoided (tree wells).

Design Criteria:

Appropriate for slopes up to 1/2 to 1.
Appropriate for velocities up to 15 feet per second.

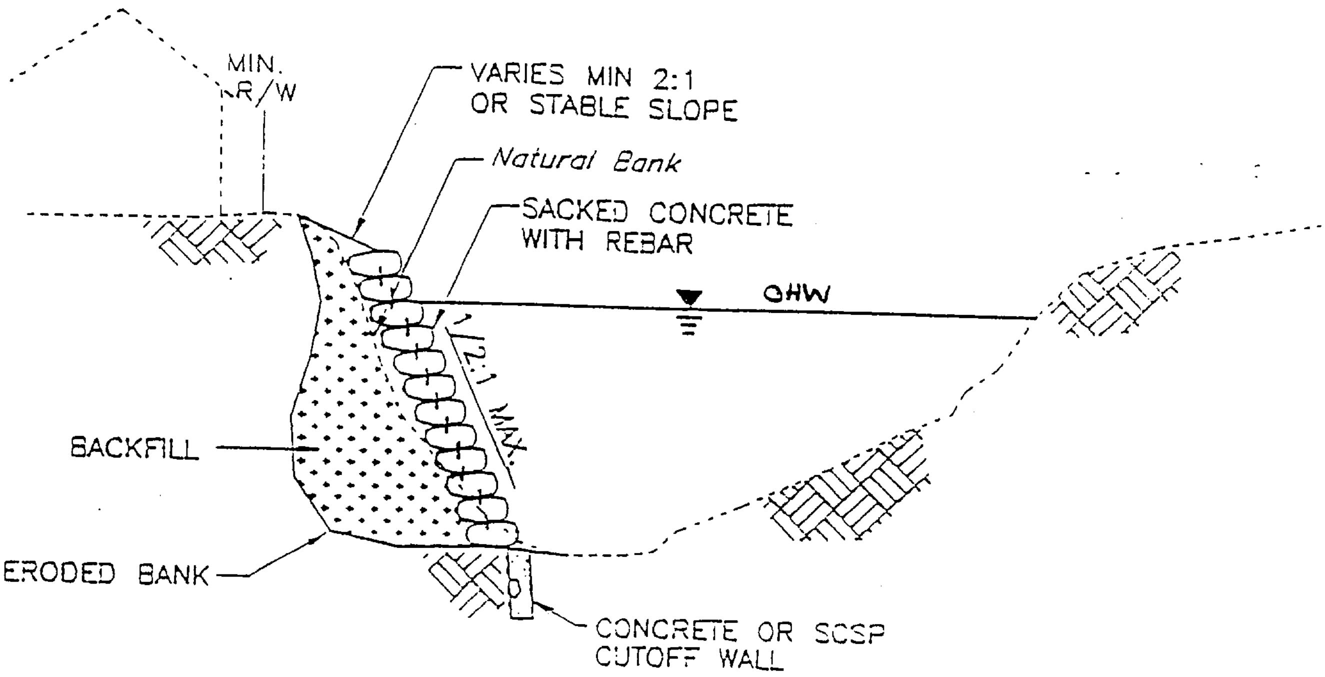
Habitat Impact Assessment:

In-stream:	Reduces or eliminates biotic potential
Stream-side:	Reduces or eliminates biotic potential

See SMP, Appendix E, Bank Protection Assessment Matrix for assessment details.

Bank Protection Measures

#13: Sacked Concrete



MIN. R/W
VARIES MIN 2:1 OR STABLE SLOPE
Natural Bank
SACKED CONCRETE WITH REBAR
OHW
1/2:1 MAX.
BACKFILL
ERODED BANK
CONCRETE OR SCSP CUTOFF WALL

Section

Bank Protection Measures

#13A: Sacked Concrete with Vortex Rock Weirs

Description:

Sacked concrete slope protection (SCSP) consists of burlap bags filled with concrete and placed against channel banks. SCSP requires a concrete or SCSP cutoff wall at the toe of the slope to prevent failure. SCSP does not provide any revegetation potential. However, it offers the opportunity to contour walls such that existing vegetation is avoided (tree wells).

Vortex boulder weirs were designed for use in high bedload streams to maintain sediment transport capacity, maintain low width to depth ratios, and provide habitat. Vortex boulder weirs provide instream cover and deepen feeding areas in riffle habitat, provide a wide range of velocities for salmonid holding water at high flows, act as grade control structures without upstream lateral migration, bank erosion, or aggradation, and maintain a low width/depth ratio to reduce sediment deposition[1]. Weirs are built on the downstream end of bank repair to help maintain profile.

Design Criteria:

Appropriate for slopes up to 1/2 to 1.

Appropriate for velocities up to 15 feet per second.

Vortex weirs are most appropriate in "F" and "B" type channels, according to Rosgen's stream classification system[1].

Habitat Impact Assessment:

In-stream:	Reduces or eliminates biotic potential
Stream-side:	Reduces or eliminates biotic potential

See SMP, Appendix E, Bank Protection Assessment Matrix for assessment details.

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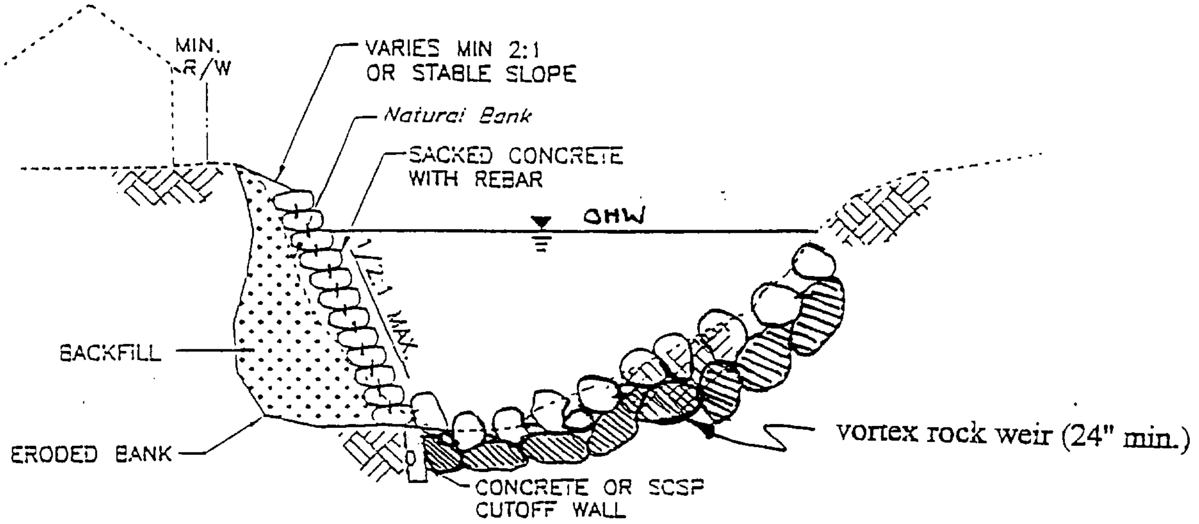
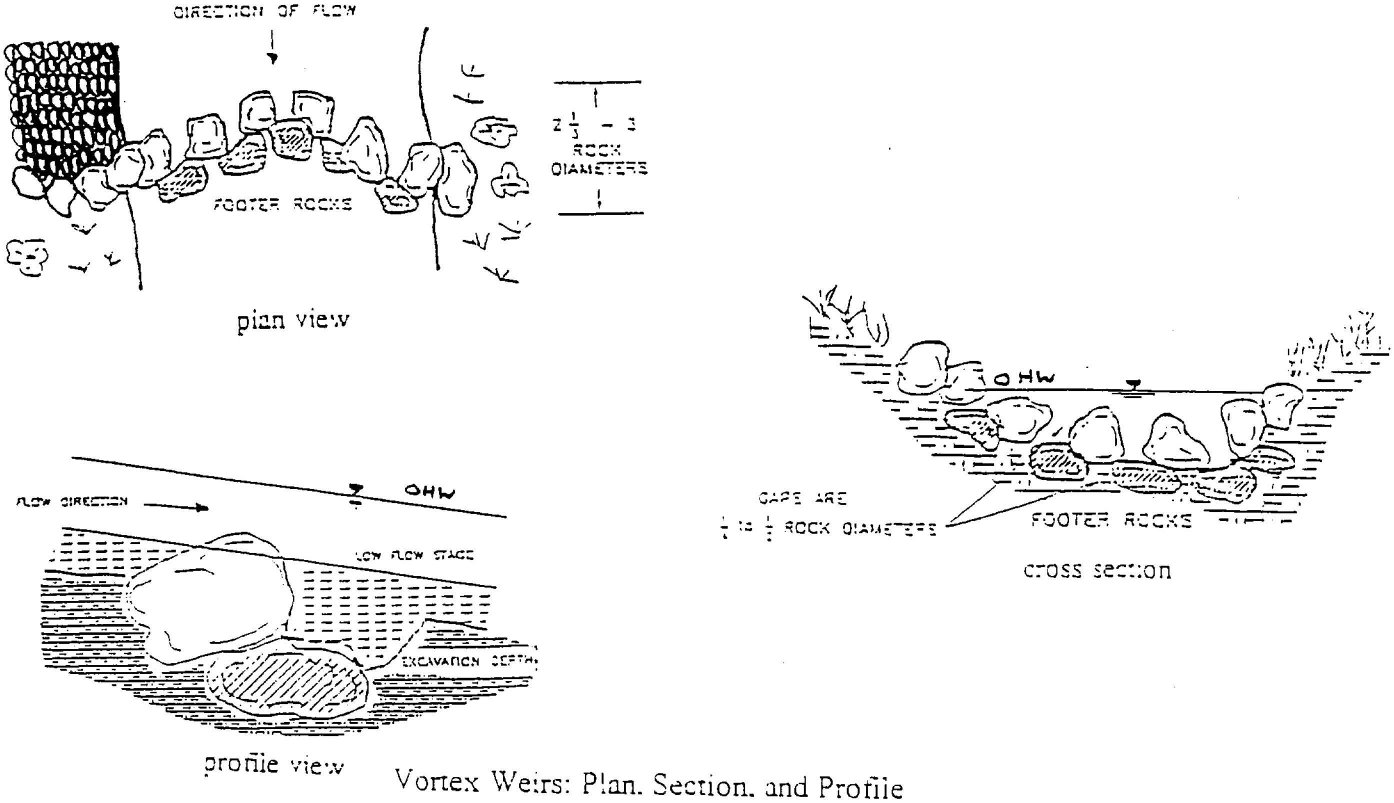
[1] Source: California Department of Fish and Game. California Salmonid Stream Habitat Restoration Manual

Bank Protection Measures

#13A: Sacked Concrete with Vortex Rock Weirs



Section



plan view

cross section

profile view

Vortex Weirs: Plan. Section. and Profile

Source: California Department of Fish and Game. California Salmonid Stream Habitat Restoration Manual

Bank Protection Measures

#14: Gunite Slope Protection

Description:

Gunite slope protection consists of a concrete mixture sprayed under presssure over an eroded bank. Reinforcing steel may be placed against the bank prior to spraying.

Design Criteria:

Appropriate for slopes up to vertical.

Appropriate for velocities up to 15 feet per second.

Habitat Impact Assessment:

In-stream:	Reduces or eliminates biotic potential
Stream-side:	Reduces or eliminates biotic potential

See SMP, Appendix E, Bank Protection Assessment Matrix for assessment details.

APPENDIX B:

MITIGATION MONITORING & REPORTING PROGRAM

Santa Clara Valley Water District

Stream Maintenance Program
Mitigation Monitoring and Reporting Program

August 2001

I. INTRODUCTION

The purpose of this Mitigation Monitoring and Reporting Program (MMRP) is to verify implementation of the mitigation measures identified in the Stream Maintenance Program (SMP) in compliance with the California Environmental Quality Act Guidelines §15097.

The Stream Maintenance Program (SMP) is a program for conducting routine stream and canal maintenance within the jurisdiction of the Santa Clara Valley Water District (District). The program is intended to apply to three major activities, sediment removal, vegetation management, and bank protection; and a group of minor activities. See Figure MMRP-1 for the location of projected SMP activities in channels. All figures and tables are attached at the end of this report. The District is a special purpose governmental agency responsible for providing water supply and flood protection for Santa Clara County, California in a cost effective and environmentally responsible manner.

In the year 2001, an Environmental Impact Report (EIR) was prepared evaluating the environmental effects of the SMP (District 2001a). Table MMRP-1 summarizes the potentially significant effects of the SMP and incorporated mitigation measures. The EIR found that potentially significant impacts from SMP activities occurred in the following major categories: removal of wetland and riparian vegetation and associated disruption of wildlife and wildlife habitat including special-status species; disruption of geomorphic stream processes which could result in additional erosion or sedimentation; degradation of water quality; and disruption of cultural resources.

Many of these impacts could be avoided or minimized by the implementation of Best Management Practices (BMPs) when routine maintenance activities are conducted in streams and canals. A compensatory mitigation package is included in the SMP to replace wetland and riparian vegetation and preserve and restore watershed lands. A portion of this compensatory mitigation package is specifically designed to compensate for impacts to special-status species. The bank protection program includes its own mitigation program which will be implemented on a case-by-case basis according to the environmental conditions of and specific design for each site. BMPs, the stream vegetation compensatory mitigation package, and mitigation associated with the bank protection program are described below with references made to more detailed reports or attachments. Chapter 5 of the SMP document (District 2001b) also includes a more detailed description of these mitigation measures.

II. BEST MANAGEMENT PRACTICES

BMPs are methods that protect environmental quality or reduce environmental impacts from stream maintenance activities. BMPs are most often implemented at the time work on an individual routine maintenance activity is conducted in the field, however, they also can be implemented at the time of planning or design. Table MMRP-1 lists the specific BMPs which will be utilized to avoid, minimize or mitigate for potentially significant impacts of the SMP. The BMP code and short title are included in Table MMRP-1. Refer to the comprehensive list of BMPs included in Appendix G of the SMP document for a more lengthy description of each BMP. This appendix also includes a description on how BMPs are selected, monitored, reported and revised.

See the Reporting section below for additional information on the revision of and reporting on BMPs.

III. COMPENSATORY MITIGATION PROGRAM FOR STREAM VEGETATION

The SMP includes compensatory mitigation for impacts to 30 acres of tidal wetlands, 106 acres of freshwater wetlands and 66 acres of riparian vegetation. Table MMRP-2 summarizes the wetland and riparian mitigation program.

The level of temporary, repetitive impacts caused by routine stream maintenance activities and the appropriate level of permanent mitigation were determined by a one-time accounting method described in Chapter IV-B of the EIR. The types of wetland and riparian vegetation impacted are more thoroughly described in Chapter IV-B of the EIR. In general, the stream vegetation has been regularly disturbed by prior maintenance and construction activities and by surrounding urban land uses. Mature riparian trees are not removed. Impacts to riparian vegetation consists of removal of woody saplings which block flood conveyance.

The compensatory mitigation package was designed to compensate for the same or similar functions as those impacted. Guiding principles were established in Chapter 5 of the SMP document with the advice of the stakeholders and regulatory agencies to assist in development of the mitigation elements. Some of these guiding principles include: mitigation will match impacts by basin; larger, sustainable sites are preferable to smaller, fragmented sites; creation of freshwater and tidal wetlands must be included as part of the mitigation program; and other mitigation techniques such as invasive species control and land preservation are acceptable.

Additional information about each component in the stream vegetation mitigation package is briefly summarized below. Final designs for each mitigation component will be developed and submitted to the regulatory agencies for their review and approval. Detailed design is underway for several of these components, and some have received preliminary review by the regulatory agencies. Maintenance work is spread out over many years, and likewise, mitigation design and implementation will be spread out over a period of approximately 10 years.

A. Tidal Wetland Restoration

The Tidal Wetland Restoration component would establish 30 acres of tidal wetland by restoring Pond A4, a diked salt evaporation pond, to historical tidal marsh conditions. The pond is located along South San Francisco Bay, and bordered by Sunnyvale East and West Channels, and Guadalupe Slough. The restoration site is expected to support tidal wetland similar to or of higher quality than the tidal wetlands impacted by repetitive maintenance activities. The pond is under ownership of the District, and is currently leased to Cargill Salt Division to continue their salt production operations until 2002.

The tidal wetland restoration concept at Pond A4 consists of lowering the outboard levees or breaching them in several strategic locations to provide full tidal action to the site. It is anticipated that a mosaic of mud flat, tidal wetland, and upland habitats will be created. A combination of natural sedimentation processes and placement of dredge fill is proposed to accelerate restoration of wetland function to the site and create beneficial reuse of clean sediment excavated from tidal streams. Modification of Sunnyvale East Channel may be included in the design to improve its hydraulic performance and eliminate the need for future sediment removal and vegetation management for flood protection purposes.

The Pond A4 project will be coordinated with other large-scale tidal marsh restoration projects proposed for South San Francisco Bay. Because of ground subsidence, reuse of clean fill material may be necessary to supplement natural sedimentation in order for wetland features to develop in the short term. Control of perennial peppergrass, an invasive species that has infested brackish and freshwater marshes in the South San Francisco Bay, will be included.

Restoration at Pond A4 will create foraging habitat for black rail and clapper rail to compensate for impacts to these special-status species from SMP activities. Pond A4 is located immediately adjacent to existing areas used by these species.

Planning and design of the Pond A4 tidal restoration are currently underway, and the following milestones are projected: mitigation and monitoring plan for submittal to the resource agencies - May 2005, detailed design - May 2007, and construction - summer 2007. The first phase of restoration on the 300-acre pond will include 30 acres credited as mitigation for the SMP. A mitigation banking instrument and funding strategy will be developed, as well as a monitoring program.

B. Freshwater Wetland Creation

The Freshwater Wetland Creation component would create 14 acres of freshwater wetlands (also known as nontidal wetlands) at Los Capitancillos, Coyote Lakes Park Site 10A, and Church Pond Number 2. These sites are currently either fields of annual grasses or a nonfunctioning percolation pond which would be converted to seasonal or perennial wetlands at locations offstream, but directly adjacent to creeks.

The District will continue searching for additional sites for freshwater wetland creation. If additional sites are found, then the Stream and Watershed Protection component (described below) of the mitigation package will be reduced accordingly.

Although the freshwater wetland creation sites will not be in-stream as the impacted freshwater wetlands, they have an advantage of not being subject to routine disturbance from flood protection maintenance as the impacted sites are. These created wetlands will provide habitat for common local wildlife and wetland-related plants in a streamside setting. Because of their off-stream location, they will rely on water supplied from off-site sources, and will require management of water levels.

1. Los Capitancillos Site

The Los Capitancillos freshwater wetland creation site will consist of approximately 3 acres of off-stream freshwater seasonal or perennial wetlands adjacent to Guadalupe Creek in the Santa Clara Basin. The site, located near Coleman Road and Redmond Avenue in the City of San Jose, is currently an upland field of annual grasses and is owned by the District.

To create suitable conditions for development of a wetland, the site will be excavated. Water will be provided from the Almaden Valley pipeline and water control structures will be constructed to allow for adjustments of water depth and duration of inundation. Native hydrophytic species will be planted.

Preliminary investigations indicate that mercury levels are elevated in surface and shallow-depth soils on the Los Capitancillos site. The elevated levels are well below hazardous materials levels, but exceed wetland creation cover material levels recommended by the California Regional Water Quality Control Board. This situation is being investigated further; however, the likely solution is that soils not suitable for wetland surfaces will be removed from the site and replaced with clean soils.

This site will be developed in coordination with an adjacent project, the restoration of a meander configuration, and shaded riparian aquatic habitat on Guadalupe Creek for fisheries values. The Guadalupe Creek project is not part of the Stream Maintenance Program.

The Los Capitancillos site is currently under design, and is expected to be installed in the year 2002. The following milestones are projected: detailed design and mitigation and monitoring plan for submittal to the resource agencies - February 2002. A preliminary mitigation and monitoring plan was submitted to the resource agencies in June 1998 (District 1998).

2. Coyote Lakes Park Site 10A

The Coyote Lakes Park Site 10A freshwater wetlands creation site will consist of at least 7 acres of near perennial freshwater wetland. The site is located in the City of San Jose in the Santa Clara Basin. The land is owned by Santa Clara County and under the management of County Parks and Recreation Department. In consideration for funding for a County Parks and Recreation bridge, County Parks and Recreation has preliminarily agreed to provide the District with an easement for wetland or riparian creation and mitigation at the Parkway Site. The two agencies expect to complete an agreement on the funding/easement exchange within the next year.

The Coyote Lakes Park site is situated on the northeast bank of Coyote Creek, just upstream of the interchange of Highways 101 and 85. The site is bounded to the northeast by Highway 101, an abandoned gravel pond to the west, and Coyote Creek, a District percolation pond and the Coyote Parkway Lakes concession to the south.

The site currently consists of nonnative annual grassland habitat. The adjacent gravel pond, percolation pond, and Coyote Creek contain open water, emergent wetland, and mixed riparian forest. Preliminary investigations indicate the site has fine-textured soils appropriate for wetland habitat establishment.

On the Coyote Lakes Park site, approximately 7 acres of near perennial freshwater wetland will be created as mitigation credited towards the SMP. The full site will comprise a mosaic of habitat types including open water, emergent wetland and riparian. Emergent marsh species to be planted included California bulrush (*Scirpus californicus*) and common tule (*Scirpus acutus*). Narrow-leaved cattail (*Typha angutifolia*) and broad-leaved cattail (*Typha latifolia*) are expected to establish via natural recruitment.

Minimal grading would be required to create the wetland on this fairly level site. Water would be delivered to the site from the adjacent percolation pond. Preliminary information regarding flows in Coyote Creek and operation of the Coyote Creek percolation pond indicate that sufficient water from the pond would be available to support a wetland on the Parkway Site. Outflow from the site could be either to the gravel pond or Coyote Creek; however, outflows may not occur on a regular basis.

Other alternative design approaches may be evaluated during the project's final design phase. For example, the adjacent abandoned 16-acre gravel pond, located between the Parkway Site and Coyote Creek, could potentially be incorporated into the site design. Under this alternative, soil excavated from the Parkway Site could be used to raise the elevation of a portion of the gravel pond to an elevation appropriate for the establishment of emergent wetland vegetation.

Additional technical investigations, including studies of soils, hydrology, and cultural resources will need to be conducted to determine the detailed design. Although no archeological resources are known to occur at the site, Native American burials were found during deep excavation of a nearby site on Coyote Creek.

Coyote Lakes Park Site 10A is currently under design, and following milestones are projected: preliminary design and engineering report - June 2004, and start of construction August 2005. A mitigation and monitoring plan was submitted to the resource agencies in April 2001 (H.T. Harvey & Associates 2001). This report indicated it may be possible to create an additional 2 acres of freshwater wetland at the Parkway Site.

3. *Church Pond No. 2*

The Church pond freshwater wetland creation site will consist of converting open water at the Church Avenue groundwater recharge ponds into approximately 4 acres of freshwater wetland. Currently, three ponds provide approximately 42 acres of surface area dedicated to groundwater recharge at the intersection of Llagas and Church Avenues in the community of San Martin in the Pajaro River Basin. The property is under the ownership of the District.

The preliminary concept calls for a 4-acre earthen bench to be installed in one pond (No. 2) in a location known to be underlain by relatively impermeable soils. Shallow groundwater investigations of the Church Avenue ponds indicate the low-permeability substrates in Pond No. 2 are likely to have relatively low infiltration rates and not contribute substantially to overall recharge performance. Therefore, converting the primary purpose and management of this pond from groundwater recharge to wetland mitigation is not expected to result in substantial loss of groundwater recharge capability. The remainder of the pond's 15-acre surface area will remain open water used for percolation. Currently, the pond is often left dry.

The project will take advantage of the existing infrastructure, pond configuration, and water management to operate the Church pond system for dual percolation and wetland mitigation purposes. For purposes of creating the wetland area, water will be supplied to the ponds from Llagas Creek and is not expected to require a substantial alteration of recent District reservoir water releases or operations. Under current operation, stored water from upstream reservoirs flows downstream as far as Church ponds during the dry season. The preliminary concept calls for water to be routed to the pond system via an existing intake pipe between Pond No. 1 and Llagas Creek.

It may be necessary to construct a flashboard dam in the creek in order to divert the water. The flashboard dam would be installed and the diversion operated during the summer dry season. The flashboard dam will be designed and operated so as to not obstruct fish passage and not cause bank erosion. This reach of Llagas Creek has limited potential to be a migratory corridor for steelhead trout. If necessary, the water diversion structure will be designed to allow for fish passage throughout the year, by installation of a fish ladder or other means, thus avoiding impacts to migrating steelhead. The cumulative effect of another fish ladder on Llagas Creek will be considered during design of this project, and alternative means to either divert water from Llagas Creek or to provide fish passage around a water intake structure will be considered. The intake pipe will be screened to prevent diversion of fish into the ponds. Alternative water delivery methods, such as an infiltration gallery, will be explored during the planning phase. The design will create water levels on the bench of an adequate depth for wetland vegetation and will reliably control surface water elevation.

Construction of the Church pond wetland creation project is expected to begin in the summer of 2003. The following milestones are projected: mitigation and monitoring plan for submittal to the resource agencies - February 2003, and detailed design June 2003.

C. Stream and Watershed Protection

The Stream and Watershed Protection component includes the purchase of approximately 820 to 1080 acres of land and conservation easements to preserve, protect, and improve streams and their associated watersheds in the county over the next 10 years. The Stream and Watershed Protection component, along with the Freshwater Wetland Creation component, mitigate for SMP impacts to freshwater wetlands. The District will continue searching for additional sites for freshwater wetland creation as described above. If additional suitable freshwater wetland creation projects are identified, then the Stream and Watershed Protection component of the mitigation package would be reduced by approximately 10 acres for every additional 1 acre of freshwater wetland creation.

The Stream and Watershed Protection Program will provide long-term protection and improvement of unique and valuable local stream resources together with their watersheds, in a largely self-sustaining setting. The primary focus is on streams that are in a fairly undisturbed state and generally good ecological condition. Streams that are currently degraded, but that can be returned to good ecological condition, can also be included in the Program.

The Stream and Watershed Protection Program consists primarily of land acquisition, but also provides for some restoration, rehabilitation and/or management projects (restoration projects). Properties containing streams and their immediate watersheds will be acquired. Restoration projects that would benefit stream resources would be conducted on selected acquisition projects or other qualifying lands, as described in Attachment A.

Of the 92 acres of mitigation credit to be provided by Stream and Watershed Protection, acquisition is projected to provide 82 acres of credit, and restoration projects are projected to provide 10 acres of credit. The relative contributions of these sub-components may be adjusted based on opportunity and resource needs identified as the mitigation program progresses.

Acquisition of these lands will most likely be accomplished by the District's donation of funds to park and open space agencies, land trusts, and other land conservation organizations that will ultimately own title or easement and manage the property. The District's contribution will typically provide partial funding of a larger acquisition, however, in some cases the District may choose to purchase and retain sole ownership or easement. Long-term land use and management conditions will be specified as part any partnership purchase agreement. Land will be monitored periodically to ensure that the terms of acquisition continue to be met.

The District will evaluate each proposed acquisition under a standard set of criteria established to ensure that the mitigation goals are met and mitigation credit is obtained. To qualify for consideration under this Stream Maintenance Program, the land must meet a standard set of core criteria (e.g., the land must include a stream, must be located in a watershed related to District streams, would not otherwise be purchased by the District, and is available from a willing seller). Additional criteria will be used to determine the relative priority for acquisition of available parcels.

Each acquired property will be further evaluated to determine if the stream resources would benefit from restoration or management actions. Examples of the many types of restoration or management actions that could be undertaken to improve stream health include: removal of nonnative riparian plant species and revegetation with native species, repair and rehabilitation of denuded or otherwise degraded stream segments, replacement of in-stream road crossings with more environmentally-sensitive crossings, installation of erosion control measures on roads adjacent to streams (dirt or paved roads run parallel to most sizeable streams in the county), and installation of fencing to limit cattle access to the riparian area.

Of the lands acquired under the Stream and Watershed Protection component, 108 acres will be specifically targeted for protection of riparian and upland habitat associated with a minimum of 2 streams that are known to support California red-legged frog and western pond turtle. All 108 of these acres will occur in Santa Clara County with at least one site in the Santa Cruz Mountains and one site in the Diablo Range.

The Program will be implemented over 10 years. Acquisition will be completed, and restoration projects will be identified in order to meet the interim milestones. The milestones are:

- 1/4 of the mitigation credit obtained by completed acquisition of property and/or identification of approved restoration projects by year 3
- ½ of credit obtained by year 6

- all of credit obtained by year 10

Attachment A contains includes a detailed mitigation and monitoring plan for the Stream and Watershed Protection Program.

D. Control of Giant Reed

The Giant Reed Control component would remove a non-native, invasive plant of riparian areas, giant reed, from 125 acres in the county. This component also includes mapping, revegetation, monitoring, and educational elements. Of the total acres from which giant reed is removed, 66 acres would be credited towards the 66 acres of impacts to riparian vegetation. An additional 59 acres of giant reed control is proposed to compensate for any lag time between maintenance impacts to stream vegetation and implementation of the mitigation components.

Giant reed is a highly invasive non-native species that infests creeks and adjacent habitat throughout Santa Clara County. Giant reed displaces native vegetation thus reducing the quality of riparian habitat. It contributes to localized flooding by blocking channels. Since giant reed displaces open water and native riparian and wetland plant communities of freshwater streams, its control is appropriate compensation for impacts to sapling riparian vegetation caused by channel vegetation management.

The following elements are included in the Giant Reed Control Program:

- Mapping of giant reed in all major streams in Santa Clara County.
- Creation of a GIS data-base to manage information on mapping and control efforts.
- Prioritization of efforts using mapping data and "target streams" concepts.
- Creation of pilot sites as a tool to create and refine an optimum control program. Pilot sites would use various control methods to determine efficacy of individual methods.
- Removal of 125 acres of giant reed from Santa Clara County streams over a period of ten years. This effort would consist of removal and disposal of bio-mass and initial treatment with an appropriate herbicide.
- Follow-up herbicide treatments for a period of 3-4 years to assure completes control of sites where giant reed has been removed.
- Revegetation of qualified areas where natural recruitment of native species is unlikely to occur and channel constraints do not preclude dense vegetation. A qualified area is defined as an area where terrestrial riparian vegetation would likely be found in an undisturbed system.
- Creation of an outreach program designed to educate landowners and the general public

about invasive species in general and about giant reed specifically.

- Participation in county-wide and regional control efforts of giant reed and other invasive species.
- Monitoring and reporting on success criteria attached to the various sub-components of the Giant Reed Control Program.

The location of giant reed removal will be identified in the first few years of the program as a result of the mapping and prioritization elements described above. Initial control will consist of removal of biomass, appropriate disposal of biomass, and treatment of clumps with an approved herbicide. Typical herbicide control would consist of applying glyphosate (primarily in an aquatic formulation) in a concentrated form to freshly cut stumps. In areas with significant remaining riparian vegetation, natural re-colonization of the treated site is expected after persistent control of giant reed clumps. Revegetation with site-appropriate native species will be implemented in areas where natural revegetation does not occur or is unlikely to occur due to the absence of adjacent parent stock. The goal of revegetation is to have 40% native cover in the treated area within 5 years after the end of treatment.

On an average basis, approximately 10 to 15 new acres of giant reed will be controlled each year. Attachment B contains includes a detailed mitigation and monitoring plan for the Giant Reed Control program.

IV. BANK PROTECTION MITIGATION

The SMP includes a bank protection program that avoids impacts to the greatest extent possible and incorporates mitigation to balance impacts that can not be avoided. The impact of bank protection depends on the type of work done and the sensitivity of the environment where the work is done. This work type/environment relationship is described in further detail in revised Appendix E of the SMP document. Appendix E of the SMP also includes a bank protection impact assessment matrix to evaluate the environmental impact of bank protection and determine when mitigation is required.

When the bank protection impact assessment matrix indicates that mitigation is required, an equivalent area of bank vegetation will be provided. To further reduce the adverse effects of bank protection, the District will mitigate for all impacts for impervious hardscape and for unvegetated rock bank protection at a ratio of 3:1 and for all vegetated rock at a ratio of 1:1 regardless of the determination of the impact assessment matrix.

Mitigation for both in-stream and stream-side impacts will consist of revegetation consistent with the Protocol for Revegetation Associated with Bank Protection in Appendix E of the SMP.

BMP 2.8 also provides that native trees between 6 and 18 inches in diameter at breast height dbh (diameter at breast height) that are lost due to bank protection impacts will be replaced at a ratio of 3:1. Non-native trees between 6 and 18 inches dbh will be replaced at a ratio of 1:1 with appropriate native species. Trees removed for installation of bank protection measures shall be replaced at the site, if feasible, or at the mitigation site created for that bank protection activity.

Mitigation for the bank protection program will be implemented on a project-by-project basis. All impacts and credits as a result of the bank protection program will be measured by area and the ongoing totals will be reported in the annual report.

V. RESPONSIBLE PARTIES

The Watershed Management Division of the District, under the guidance of Mr. Jim Fiedler, Deputy Operating Officer, has the responsibility for implementing and monitoring the SMP mitigation measures.

VI. REPORTING

As described further in Chapter 3 of the SMP document, each November, District staff will hold a "Lessons Learned" meeting to evaluate the SMP program including the BMPs and mitigation. Projects from the preceding season will be reviewed, and modifications to BMPs considered.

An annual report detailing what routine stream maintenance work was accomplished in the prior construction season will be submitted to the District's Chief Executive Officer, the US Army Corps of Engineers, the US Fish and Wildlife Service, California Department of Fish and Game, San Francisco Bay Conservation and Development Commission, National Marine Fisheries Service, the San Francisquito Joint Powers Authority and the Regional Water Quality Control Boards at the end of the maintenance season (prior to January 1) which will specify which projects were completed for the year including type of work, location, and size of the project. Sediment removal, vegetation management, and bank protection work which has been repeated under the SMP will be distinguished from areas where such work is being undertaken for the first time under the SMP. Any modifications of BMPs recommended at the annual lessons learned meeting will be summarized in the annual report.

In addition to reporting on the maintenance activity completed for the year, the District will also provide reporting on the implementation of the mitigation program, including maps showing the location of compensatory mitigation sites, a description of the current stage in the planning and implementation schedule, progress towards success criteria, and a general summary of maintenance of mitigation sites.

For the first 5 years of the program, the District will provide the agencies with a tour of representative work areas for that year and all mitigation sites. This tour will take place after completion of the work season. Preconstruction photographs will also be provided. The District's Geographic Information System (GIS) may be utilized as a tool for reporting annual work activities and implementation of mitigation projects.

VII. REFERENCES

District. 1998. Urgent Sediment Removal Project - Compensatory Wetlands Mitigation and Monitoring Plan. Los Capitancillos Freshwater Wetlands Mitigation site and Pond A-8 Tidal Wetlands Mitigation Site. June 8, 1998.

District. 2001a. Final Environmental Impact Report and Stream Maintenance Program Report for the Multi-Year Stream Maintenance Program. August 2001.

District. 2001b. Draft Environmental Stream Maintenance Program. March 2001. *(And any subsequent updates).*

H.T. Harvey & Associates. 2001c. Coyote Creek Parkway Wetland Mitigation Site - Mitigation and Monitoring Plan. Revised May 1, 2001.

Table MMRP-1
Summary of Potentially Significant Impacts and Mitigation Incorporated into the SMP

Key to Table:

Impact:	The impact number and short description from EIR Chapter IV.
BMP Code	The code number cross referencing BMPs in EIR Chapter IV and SMP Appendix G, Best Management Practices listing.
Short Title	Short title of the BMP
Activity	Category of maintenance activity most affected: SR = Sediment Removal; VM = Vegetation Management; BP = Bank protection; MM = Minor Maintenance.

Note: the full text of the BMPs can be found in Appendix G of the SMP.

Impacts	**BMP Code**	**Short Title**	**Activity**
Unavoidable Adverse Impacts that would Remain after Mitigation			
IV-B. Biology			
Impact Bio-4: The cumulative impact of sediment removal and vegetation management would fragment wildlife habitat.	1.13	Prevent Scour Downstream of Sediment Removal	SR
	2.1	Minimize vegetation removal	All
	3.6	Remove Sediment from One Side of Large Channels in Alternate Years at Selected Sites	SR
	Off-site Compensatory Mitigation		
Impacts That Would Be Mitigated to Less than Significant			

Impacts	BMP Code	Short Title	Activity
IV-A. Geomorphology			
Impact Geo-1. Sediment removal in certain locations may increase erosion downstream of the removal site.	1.13	Prevent Scour Downstream of Sediment Removal	SR
Impact Geo-2. Elimination of in-channel vegetation may increase sediment accumulation downstream.	1.14	Minimize Sediment Transport Downstream from In-channel Herbicide Sites	VM
Impact Geo-3. Removal of vegetation may increase local erosion.	1.16	Minimize Local Erosion increase from In-channel Vegetation Removal	VM
Impact Geo-4. Bank protection measures can direct flows downstream, resulting in new erosion and bank instability problems.	1.15	Prevent Erosion Downstream of Bank Protection Sites	BP
Impact Geo-5. Removal of woody debris may reduce channel bed diversity.	3.9	Retain Woody Materials and Vegetation	BP, MM
IV-B. Biology			
Impact Bio 1: Sediment removal and vegetation management would impact in-stream wetland and riparian vegetation.	1.13	Prevent Scour Downstream of Sediment Removal	SR
	2.1	Minimize vegetation removal	All

Impacts	BMP Code	Short Title	Activity
	3.6	Remove Sediment from One Side of Large Channels in Alternate Years	SR
	Off-site Compensatory Mitigation		
Impact Bio-2: The project could result in removal of heritage-sized trees.	2.1	Minimize vegetation removal	All
	2.2	Minimize Stream Access Impacts	SR, BP
	2.8	Replace heritage trees	BP
	3.9	Retain Woody Materials and Vegetation	BP, MM
Impact Bio-3: Program implementation could introduce invasive plant species into native, riparian, or wetland habitat areas.	2.1	Minimize vegetation removal	All
	2.5	Planting	BP
	2.6	Mulching	BP
	2.7	Seeding	BP
Impact Bio-5: Bank protection would cause a loss of riparian vegetation functions and values, which would cause a significant cumulative adverse impact on wildlife and fisheries habitat.	2.1	Minimize vegetation removal	All
	2.3	Minimize Hardscape in Bank Protection Design	BP
	2.5	Planting	BP

Impacts	BMP Code	Short Title	Activity
	3.5	Minimize Loss of Aquatic Habitat from Bank Protection work	BP
	3.14	Maintain or Provide Escape Cover	BP
	1:1 and 3:1 offsite mitigation plantings for planted rock and impervious/unplanted rock designs, respectively		
Impact Bio-6: The cumulative effects of resuming herbicide use in the Pajaro River Basin would substantially reduce the value of the habitat for wildlife.	2.1	Minimize vegetation removal	All
	3.2	Minimize Impacts to Breeding Birds Via Site Assessments and Avoidance Measures	All
	3.18	Herbicide use in aquatic areas	VM
	3.19	Develop a biodiversity monitoring program	All
	Off-site Compensatory Mitigation		
Impact Bio-7: Chemical use by the District, especially for rodent control, could adversely affect non-target species.	2.1	Minimize vegetation removal	All
	3.1	Minimize Impacts to Special-status Animals Via Site Assessments and Avoidance Measures	All
	3.18	Herbicide Use in Aquatic Areas	VM
	3.2	Minimize Herbicide Impacts on Non-target species	VM

Impacts	BMP Code	Short Title	Activity
	3.21	Minimize Rodent Control Impacts on Non-target Species	MM
	4.7	Herbicide Use Requirements	VM
Impact Bio-8: Maintenance activities could introduce invasive wildlife species.	3.4	Mitten Crab Control Measures	SR
Impact Bio-9: Maintenance activities could directly harm nesting species protected under the Migratory Bird Treaty Act and other statutes.	2.1	Minimize vegetation removal	All
	3.2	Minimize Impacts to Breeding Birds Via Site Assessments and Avoidance Measures	All
	3.9	Retain Woody Materials and Vegetation	BP, MM
	3.19	Develop a Biodiversity Monitoring Program	All
Impact Bio-10: Maintenance work conducted in channels could substantially interfere with migration, spawning, incubating, or rearing habitat for native aquatic species.	2.2	Minimize Stream Access Impacts	SR, BP
	3.7	Salvage Native Aquatic Vertebrates from Dewatered Channels	SR, BP
	3.9	Retain Woody Materials and Vegetation	BP, MM
	3.11	Avoid Dewatering an Entire Isolated Stream Reach	SR, BP
	3.12	Maintain Low-flow Fish Passage	SR, BP

Impacts	BMP Code	Short Title	Activity
	3.13	Remove Temporary Fills as Appropriate	SR, BP
	3.14	Maintain or Provide Escape Cover	SR, BP
	3.15	Restore Riffle and Pool Configuration of Channel Bottom	SR, BP
	3.16	Restore Spawning Gravels in Work Site Areas	SR, BP
	3.17	Reuse Sediments and Gravels As Appropriate	SR
Impact Bio-11: Temporarily suspended sediment can adversely affect aquatic or semi-aquatic species.	1.1	Conduct Work During Low Flow Periods	All
	1.2	Tidal Work Areas	SR
	1.3	Dewater/ Bypass Water at Non-tidal Sites	SR, BP
	1.4	Avoid Erosion When Restoring Flows	SR, BP
	1.5	Erosion and Sediment Control Measures	BP
	1.6	Use of Wheel and Track Mounted Vehicles in Stream Bottoms	SR, BP
	1.7	Pump/ Generator Set Operations and Maintenance	SR, BP

Impacts	BMP Code	Short Title	Activity
	1.8	Handle Sediments So As to Minimize Water Quality Impacts	SR
	1.9	Soil Stockpiles	SR
	1.12	Groundwater Management	SR, BP
	1.14	Minimize Sediment Transport Downstream from In-channel Herbicide Sites	VM
	1.15	Prevent Erosion Downstream of Bank Protection Sites	BP
	2.2	Minimize Stream Access Impacts	SR, BP
	3.1	Conduct In-Channel Work During the Dry Season	SR, BP
Impact Bio-12: Sediment Removal would adversely affect special-status species.	1.3	Dewater/ Bypass Water at Non-tidal Sites	SR, BP
	1.4	Avoid Erosion When Restoring Flows	SR, BP
	2.4	Minimize Impacts to Special-status Plants by Avoidance Based on Site Assessments	All
	3.1	Minimize Impacts to Special-status Animals Via Site Assessments and Avoidance Measures	All

Impacts	BMP Code	Short Title	Activity
	3.2	Minimize Impacts to Breeding Birds Via Site Assessments and Avoidance Measures	All
	3.3	Avoid serpentine habitat	All
	3.6	Remove Sediment from One Side of Large Channels in Alternate Years	SR
	3.7	Salvage Native Aquatic Vertebrates from Dewatered Channels	SR, BP
	3.9	Retain Woody Materials and Vegetation	BP, MM
	3.1	Conduct In-Channel Work During the Dry Season	SR, BP
	3.11	Avoid Dewatering an Entire Isolated Stream Reach	SR, BP
	3.12	Maintain Low-flow Fish Passage	SR, BP
	3.15	Restore Riffle and Pool Configuration of Channel Bottom	SR, BP
	3.16	Restore Spawning Gravels in Work Site Areas	SR, BP
	4.5	Vehicle and Equipment Cleaning	All
	6.1	Spill Prevention	All

Impacts	BMP Code	Short Title	Activity
	6.4	Vehicle and Equipment Fueling	All
	6.5	Vehicle and Equipment Maintenance	All
Impact Bio-13. Vegetation Management would adversely affect special-status species.	1.14	Minimize Sediment Transport Downstream from In-channel Herbicide Sites	VM
	2.1	Minimize vegetation removal	All
	2.2	Minimize Stream Access Impacts	SR, BP
	2.4	Minimize Impacts to Special-status Plants by Avoidance Based on Site Assessments	All
	3.1	Minimize Impacts to Special-status Animals Via Site Assessments and Avoidance Measures	All
	3.2	Minimize Impacts to Breeding Birds Via Site Assessments and Avoidance Measures	SR, BP
	3.3	Avoid serpentine habitat	All
	3.7	Salvage Native Aquatic Vertebrates from Dewatered Channels	SR, BP
	3.1	Conduct In-Channel Work During the Dry Season	SR, BP

Impacts	BMP Code	Short Title	Activity
	3.18	Herbicide Use in Aquatic Areas	VM
	3.2	Minimize Herbicide Impacts on Non-target species	VM
	4.7	Herbicide Use Requirements	VM
Impact Bio-14. Bank Protection would adversely affect special-status species.	1.5	Erosion and Sediment Control Measures	BP
	2.3	Minimize Hardscape in Bank Protection Design	BP
	2.4	Minimize Impacts to Special-status Plants by Avoidance Based on Site Assessments	All
	2.5 2.6 2.7	Planting, Mulching, Seeding	BP
	3.1	Minimize Impacts to Special-status Animals Via Site Assessments and Avoidance Measures	All
	3.2	Minimize Impacts to Breeding Birds Via Site Assessments and Avoidance Measures	All
	3.3	Avoid serpentine habitat	All

Impacts	BMP Code	Short Title	Activity
	3.7	Salvage Native Aquatic Vertebrates from Dewatered Channels	SR, BP
	3.14	Maintain or Provide Escape Cover	BP
	3.19	Develop a Biodiversity Monitoring Program	All
Impact Bio-15: Minor Stream Maintenance Activities would adversely affect special-status species.	2.4	Minimize Impacts to Special-status Plants by Avoidance Based on Site Assessments	All
	3.1	Minimize Impacts to Special-status Animals Via Site Assessments and Avoidance Measures	All
	3.2	Minimize Impacts to Breeding Birds Via Site Assessments and Avoidance Measures	All
	3.3	Avoid serpentine habitat	SR, BP
	3.7	Salvage Native Aquatic Vertebrates from Dewatered Channels	SR, BP
	3.9	Retain Woody Materials and Vegetation	BP, MM
	3.1	Conduct In-Channel Work During the Dry Season	SR, BP

Impacts	BMP Code	Short Title	Activity
	3.21	Minimize Rodent Control Impacts on Non-target Species	MM
IV-D. Public Safety			
Impact WQ-1. Erosion of mercury containing sediment.	1.10	Avoid Exposing Soils with High Mercury Levels	BP
Impact Haz-1. Preventing exposure of mercury during bank protection.			

Impacts	BMP Code	Short Title	Activity
IV-E. Cultural			
Impact Cul-1: Disruption of Cultural Resources **Impact Cul-2:** Disruption of Native American Burials	7.1	Discovery of Cultural Remains or Historic Artifacts	All
	7.2	Review of Projects with Native Soil	All

Table MMRP-2
Compensatory Stream Vegetation and Special Status Species Mitigation

Mitigation Component	Location	Size of Mitigation	Compensates for Impacts to:	Description	Installation Date
Tidal Wetland Restoration	Pond A4	30 acres	30 acres of tidal wetlands: • 29 acres from sediment removal • 1 acre from vegetation mgmnt. Will provide foraging habitat for California clapper rail and black rail.	Restore diked salt evaporator pond to historical tidal marsh conditions	2007
Freshwater Wetland Creation	Three sites currently identified:		14 acres of freshwater wetland in stream channels: • 10 acres in Santa Clara Basin • 4 acres in Pajaro River Basin		
	• Los Capitancillos	3 acres, Santa Clara Basin		Convert annual grasslands to seasonal or perennial wetlands adjacent to Guadalupe River	2002
	• Coyote Lakes Park Site 10A	7 acres, Santa Clara Basin		Convert ruderal grasslands to near-perennial wetlands adjacent to Coyote Creek	2005
	• Church Pond No. 2	4 acres, Pajaro River Basin		Convert open water in inactive percolation pond to wetland bench	2003
Stream and Watershed Protection	Undeveloped parcels with streams	Approx. 820 to 1,080 acres purchased and additional restored	92 acres of freshwater wetlands: • 74 acres in Sta Cl Basin streams • 11 acres in Paj Bas. streams • 7 acres in canals • Includes preservation/ restoration of 108 acres of mitigation on land known to support California red-legged frog and western pond turtle.	Preserve, protect, and improve streams and associated watersheds	As lands become available in first 10 years.
Giant Reed Control	Throughout county	125 acres	66 acres of riparian vegetation from vegetation management: • 32 acres in Santa Clara Basin • 34 acres in Pajaro River Basin And, 59 acres of the total 125 acres of Giant Reed Control is being provided for lag time in implementing and effective functioning of mitigation components	Control giant reed outbreaks and provide associated mapping, revegetation, education, and coordination throughout county	2002-2012

ATTACHMENT A

STREAM AND WATERSHED PROTECTION PROGRAM MITIGATION AND MONITORING PLAN

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1.0 INTRODUCTION AND PROGRAM OVERVIEW

The purpose of the Stream and Watershed Protection (S&WP) Program is to provide compensatory mitigation for Stream Maintenance Program (SMP) wetland impacts in the SMP work areas (figure MMRP-1). The S&WP Program supports the overall SMP compensatory mitigation program goal to "balance opportunity, feasibility, and cost to provide the maximum benefit to the natural function of the watersheds and streams of Santa Clara County".

The S&WP Program will provide long-term protection and improvement of unique and valuable local steam resources together with their watersheds, in a largely self-sustaining setting. The primary focus is on streams that are in a fairly undisturbed state and generally good ecological condition. Streams that are currently degraded, but that can be returned to good ecological condition, can also be included in the Program.

The S&WP Program consists primarily of land acquisition, but also provides for some restoration, rehabilitation and/or management projects (restoration projects). Properties containing streams and their immediate watersheds will be acquired. Restoration projects that would benefit stream resources would be conducted on selected acquisition projects or other qualifying lands, as described in this document.

Of the 92 acres of mitigation to be provided by S&WP, acquisition is projected to provide 82 acres of credit, and restoration projects are projected to provide 10 acres of credit. The relative contributions of these sub-components may be adjusted based on opportunity and resource needs identified as the mitigation program progresses.

The term "acquisition" in this document refers to the purchase of fee title or less-than-fee-title (i.e. conservation easement) by the District, or contribution to the acquisition of fee title or easement by another entity. Definitions of "restoration" and "rehabilitation" follow US NRCS 1998.

1.1 Program Area

S&WP Program projects will be located on selected streams within District-related watersheds. Figure MMRP-2 is a schematic depiction of the approximate area of interest for the S&WP Program.

1.2 Dual Mitigation Use

S&WP Program projects that provide mitigation credit for SMP wetland impacts may, in some cases, also provide mitigation for other impacts, including SMP Endangered Species mitigation for red-legged frog and pond turtle. Projects must meet any additional ESA-specific mitigation criteria in order to qualify for ESA mitigation. Only those projects that satisfy the criteria for both the S&WP Program and ESA or other mitigation can be used for dual mitigation credit.

2.0 PROGRAM GOAL AND OBJECTIVES

The goal of the S&WP Program is to preserve, protect and improve the ecological condition of selected local streams and their associated watersheds.

The objectives of the S&WP Program are to:

1) Provide the required mitigation credit for wetland impacts from the SMP
2) Promote self-sustaining, natural process-driven stream and watershed system structure and function (i.e. promote maintenance of dynamic equilibrium with a minimum of human intervention or manipulation).
3) Preserve and protect streams that are currently in good ecological condition
4) Improve stream segments that are disturbed or degraded
5) Provide multiple benefits, whenever possible, by working in a programmatic fashion that takes the regional context and needs into account
6) Identify and select feasible and cost effective projects that, on balance, provide the most environmental benefit to stream resources

3.0 ACQUISITION ELEMENT

3.1 Overview

Lands containing selected streams and their immediate adjacent watershed will be acquired. Examples of suitable land includes ranch land, farm land, and other undeveloped or sparsely developed land. The acquisition element will be mostly accomplished by donating funds to park and open space agencies, land trusts, and other land conservation organizations that will ultimately own title or easement and manage the property. The District's contribution will typically provide partial funding of a larger acquisition, however, in some cases the District may choose to purchase and retain sole ownership or easement.

The District will evaluate each potential acquisition project using a hierarchical decision process. At the first tier, each potential acquisition project must meet a standard set of mandatory criteria, termed "Requisite Criteria", to qualify under the Program (Appendix A). These criteria ensure that the mitigation goal is met and mitigation credit is obtained (e.g., land must include a stream of a minimum size and condition, must be located in a watershed associated with a stream in District jurisdiction, must be located in the basin in which impacts occur). Any project that satisfies the Requisite Criteria would meet the program goal and objectives 1- 3 (Section 2.0), and could provide mitigation credit.

Those parcels that meet the Requisite Criteria will be further evaluated using Priority Evaluation Considerations (Appendix B) to determine their relative priority for acquisition. Priority Evaluation Considerations include site-specific habitat features (e.g., type and condition of stream resources, presence of endangered species or habitat), acquisition transaction-related features (e.g., level of protection gained, time frame for purchase), and regional considerations (e.g., links with adjacent protected lands, provision of multiple agency and community benefits). Relative priority for acquisition will be determined based on a collective qualitative assessment of these considerations. Higher ranked parcels will be recommended for purchase. Review and ranking under the Priority Evaluation Considerations ensures that S&WP Program objectives 5 and 6 are met (Section 2.0).

Characterization of site and project features will be based on existing, available data (e.g., USGS and other maps, aerial photographs, reports, etc.), and on reconnaissance-level field surveys. See Appendix C for an example of report graphics for acquisition projects.

Acceptable long-term land use and land management parameters, particularly for the mitigation credit area of a parcel, will be specified as part any partnership purchase agreement. Land will be monitored periodically to ensure that the terms of acquisition continue to be met. The tentative schedule for site inspections is every 2 years for the first 10 years after acquisition, and every 5 years thereafter. Any District-owned or managed lands will also be inspected on the same schedule.

3.2 Implementation Plan

The general approach for acquisition implementation is outlined below.

- Identify available land (project)
- Determine if project qualifies for Program (i.e. meets Requisite Criteria)
- Review Priority Evaluation Considerations for qualified projects
- Recommend and obtain approval for acquisition of higher priority projects from permitting agencies (if necessary, see section 5.0) and District Board of Directors (required for all District land purchases)
- Purchase or contribute to purchase of fee title or easement on preferred parcels
- Conduct long-term periodic monitoring to confirm intended land use and management

3.3 Mitigation Credit

Mitigation credit is directly linked with the presence of streams on-site, and the proximity of the watershed land to the stream(s). Maximum credit is obtained for land that includes the stream and its most immediate adjacent watershed. Less credit is obtained for watershed land somewhat further from the stream.

The crediting ratio and approach is designed to guarantee that substantial benefit is generated to streams when applied on a programmatic basis to a variety of sites with variable characteristics. The relatively high mitigation-to-impact acre ratio ensures protection of large amounts of stream and watershed area compared to impacts. Inclusion of immediately adjacent watershed land recognizes and values the integral function of streams and watersheds. Although the entire watershed influences stream condition, those areas closest to the stream may exert the strongest influence. The mitigation zones create practical stream management areas, and incorporate adequate area to provide for a variety of stream functions, including support of stream-dependent species that also use watershed areas, such as red-legged frog.

The crediting formula is:

- Maximum credit: 10:1 - including and nearest to the stream. This comprises the area within 50 feet of the centerline on 1st order streams, and within 150 feet of centerline on 2nd order and larger streams.

- Minimum credit: 15:1 - including watershed land further from the stream. This comprises the area within 150 to 500 feet of the centerline of 2nd order and larger streams

The minimum amounts of stream and immediate watershed acreage and stream length obtained by application of this crediting formula are:

- A minimum of 10 acres of stream and immediate watershed land acquired per acre of wetland impacted
- A minimum of 1 mile of stream acquired per 10 acres of wetland impacted

Under this formula, more than the minimum acreage or stream miles may be obtained per acre of impact, depending on acquisition site features (e.g., relative amounts of 1st and 2nd order streams, available adjacent watershed widths).

See Appendix C for an example of acquisition project credit area determination.

3.4 Final Success Criteria

The final measure of success will be the completed acquisition of fee title or easements on land selected in accordance with the Requisite Criteria and the Priority Evaluation Considerations in the amount required to fulfill total mitigation obligations.

4.0 RESTORATION, REHABILITATION AND/OR MANAGEMENT ELEMENT

4.1 Restoration, Rehabilitation and/or Management Overview

Properties under consideration for acquisition will be evaluated to determine whether the steam resources would benefit from restoration, rehabilitation and/or management projects (restoration projects). Restoration projects may also be conducted on other lands not acquired under this program. These lands must have the qualifying physical and management characteristics listed under Requisite Criteria (i.e., stream size, stream condition, habitat contiguity, basin locations, and land management). The feasible restoration projects deemed to produce good benefit at a reasonable cost will be recommended for implementation. Implementation of restoration projects meets S&WP Objective No. 4 (Section 2.0)

Examples of actions that could be done to improve stream condition include: 1) removal of nonnative riparian plant species and revegetation with native species; 2) sedimentation reduction measures such as stream-side and watershed road modifications and culvert re-design; 3) and reduction of trampling by installation of fencing and alternative water sources to limit cattle and feral pig access to sensitive riparian areas.

Restoration projects for streams that meet the S&WP Program standard for good ecological condition (as defined under Requisite Criteria, Appendix A) would be optional. Restoration projects would be mandatory for acquisitions that do not meet the S&WP Program standard for good ecological condition, in order to bring them up to the defined standard.

Project implementation includes individual project planning, permitting, environmental review, design, installation, monitoring, and maintenance, as appropriate for the specific project. An individual project-specific MMP will be formulated for each project. The MMP will include the project description, goal, implementation plan and schedule, success criteria, monitoring types and methods, maintenance plan and monitoring report schedule.

4.2 Implementation Plan

The general approach for implementation of restoration projects is outlined below.

For Lands Acquired by the S&WP Program:

- Preliminary identification of potential restoration, rehabilitation and/or management needs (pre-acquisition)
- Priority evaluation, feasibility analysis and final identification of restoration projects (post-acquisition for optional restoration projects, pre-acquisition for mandatory projects)
- Submit proposed higher priority projects to S&WP Review Panel, if necessary (see section 5.0) and District Board for approval (Board approval is required for all District land purchases)
- Draft a project-specific MMP
- Implement and monitor project in accordance with the project-specific MMP

For Other Lands:

- Determine that the proposed project qualifies for initial consideration. The project must be located on land that satisfies the physical feature and management elements of the Requisite Criteria (Criteria 1-6, Appendix A)
- Review and rank the priority of qualified parcels based on the site-specific habitat and regional aspects of the Priority Evaluation Considerations (Appendix B)
- For higher-ranked lands, follow steps under "For Acquisition Lands" above

4.3 Mitigation Credit

Credit for restoration projects will be generated on a dollar value basis as follows: 1 acre of mitigation credit is obtained for each $150,000 of projects funded. The $150,000 figure is based on the approximate per acre cost of District riparian mitigation projects recently implemented in the lower watershed. The cost per acre includes, as applicable, project design (including conceptual design, detailed design, MMP, Engineer's Report), installation or other actions, monitoring, reporting, and maintenance.

Initial identification of potentially suitable restoration or management projects, project-specific CEQA evaluation, permit acquisition, S&WP Review Panel process (if required, see Section 5.0), land use agreement negotiation, and consultant and construction contract management are not included in the cost per acre figure. Therefore, the per-acre cost to the District is greater than $150,000, and will vary based on project needs. The $150,000 per acre cost will be adjusted to reflect inflation as the program progresses.

4.4 Final Success Criteria:

Final success criteria will be formulated on a project specific basis to determine if a project is trending towards, or has achieved the individual defined project goal. The criteria will be specified in the MMP. Success criteria will consist of qualitative or quantitative evaluation of physical features such as vegetation, soil condition, sedimentation, erosion, and condition of installed features (e.g., culverts, fences). For example, a revegetation project may have quantitative plant survival, vegetative cover, and vegetation type performance and success criteria like those of a standard revegetation project. A culvert retrofitting project might require periodic inspection to confirm proper operation and visual evidence of reduced soil erosion.

The S&WP Program restoration element will be completed when all projects required to meet the SMP mitigation obligation have met their individual success criteria.

5.0 PROJECT REVIEW AND APPROVAL

This document provides an initial program description and approach. As the Program progresses, implementation details may be modified to make improvements, as long as these are consistent with the program goal and objectives. Initially, acquisition and restoration projects will be reviewed and approved by permitting agencies on a case-by-case basis prior to implementation. Less oversight is expected over time, however, as implementation experience is used to "fine tune" the implementation process. The ultimate goal is to formulate reliable criteria and procedures that eliminate the need for prior project review and approval by permitting agencies. Once this is accomplished, proposed and completed projects will continue to be fully documented in the District's annual S&WP Program monitoring report to the agencies.

A review panel comprising permitting agency and District staff will be set up to expedite the project review process. This is a necessary function of a programmatic land acquisition program, which relies upon the ability to act quickly and efficiently to capitalize on opportunities. The members of the S&WP Review Panel will convene, review and decide on approval of proposed acquisition projects (and any linked mandatory restoration projects required to restore minimum ecological condition as set for in Requisite Criteria, see Section 4.1) within 4 weeks of notification by the District. Otherwise, after the 4 week notification period, the project will automatically be approved. Optional restoration projects will be reviewed and approved within 12 weeks of notification by the District, or automatically approved.

6.0 RESPONSIBLE PARTIES

The District will be responsible for the implementation and success of the mitigation program. The Program contact is Ms. Gale Rankin, Biologist III, Ecological Services Unit.

7.0 SCHEDULE

The Program will be implemented over 10 years. Acquisition will be completed, and restoration projects will be identified in order to meet the interim milestones. The milestones are:

- 1/4 of the mitigation credit obtained by completed acquisition of property and/or identification of approved restoration projects by year 3
- ½ of credit obtained by year 6

- all of credit obtained by year 10

The target for restoration project implementation is within 3 years after project approval.

8.0 PROGRAM MONITORING AND REPORTING

An annual S&WP Program report will be prepared and submitted to the relevant agencies for 10 years or until all required mitigation credit is obtained under the S&WP Program. The report will summarize all S&WP Program actions, their status, mitigation credits obtained to date, and will compare progress to the program schedule and interim milestones.

The annual Program report will document progress towards attainment of the Program acquisition and restoration project success criteria. Each annual report will include a description of all parcels considered and acquired in the past year, detailing the location, size, and stream and watershed amount present. The report will summarize the Requisite Criteria and Priority Evaluation Criteria analyses. The mitigation credit earned, the entity that will own the fee title or conservation easement, planned land use (e.g., public park or open space, private ranch land, farm land), and planned restoration projects will be described for all acquired parcels. Maps showing acquired parcel locations, boundaries, streams, and mitigation credit areas will be included (see Appendix C). Summary descriptions of all proposed, approved and implemented acquisition and restoration projects for all years will also be provided.

In addition, individual monitoring reports based on the project-specific MMPs will be prepared for each restoration project (Section 4.1). Monitoring programs and report contents will be appropriate for the particular action taken. Individual monitoring reports will be submitted with the Program report.

Both the Program and individual site-specific monitoring reports will identify potential problems that may prevent attainment of project success, and recommend and document any remedial actions. The annual Program report will describe any changes to in program methods or procedures, including those that result from S&WP Review Panel recommendations.

The S&WP Program is a biological mitigation program, and Program monitoring and reporting will be prepared under the supervision of a qualified biologist or other qualified environmental specialist. Restoration project monitoring and reporting will be done by qualified professionals with expertise in the major field of endeavor (e.g., civil engineer for erosion control measures on culverts and roads, biologist for fish passage or revegetation).

Periodic long term monitoring of acquisition projects will be conducted to ensure that land use and management is consistent with the terms and agreements of the District's financial contribution (Section 3.1). Long-term monitoring of restoration projects will be conducted as specified in the project-specific MMPs, as needed to ensure long-term functional success of projects.

Long-term monitoring reports will be submitted in post-completion years 5 and 10 (after full mitigation credit has been obtained by the Program). In post-completion year 10, the need for further monitoring and reports to document acquisition and restoration project status will be evaluated. Further monitoring and reporting will be continued or discontinued as determined at that time. Reporting shall continue no longer than the life of the SMP for which mitigation is provided.

9.0 CONTINGENCY MEASURES

If success standards for individual projects or the program as a whole are not met and there is reason to believe that they will not be met , and analysis of the causes will be conducted and, if deemed necessary, corrective actions will be taken.

10.0 REFERENCES

United States Natural Resources Conservation Service (US NRCS); United States. Federal Interagency Stream Restoration Working Group. 1998. Stream Corridor Restoration: Principle, Purposes, Practices. Washington, D.C. : Natural Resources Conservation Service ; Springfield, Va.. Distributed by National Technical Information Service.

APPENDIX A

SCVWD STREAM AND WATERSHED PROTECTION PROGRAM REQUISITE CRITERIA FOR LAND ACQUISITION

All of the Requisite Criteria must be satisfied for a parcel to qualify for acquisition and mitigation credit.

(1) The land includes a second order or greater stream reach (stream order determined from USGS 7.5' quadrangle map), as determined from the upstream end (per Strahler 1957 in US NRCS 1998).

(2) The streams on-site are or can be improved to be in good ecological condition by this program (see stream condition determination below)

A stream on the acquisition parcel will be considered to be in good condition if the following criteria are met:

a) The stream reach on the acquisition parcel is largely unaltered by direct modification

- On at least 80% of the stream length occurring on the parcel, the stream bed and bank is natural, with bottom and side slopes of native material, and with little or no evidence of direct physical modification (i.e. channel not mechanically straightened, widened, covered with hardscape or crossed by bridges for more than 20% of channel length).
- If less than 80% of the stream length is in the condition described above, the stream bed or banks can and will be rehabilitated or restored for at least 80% of stream length.

b) The stream reach on the acquisition parcel supports predominantly native riparian or other native woody vegetation consistent with site potential.

- For at least 80% of the stream length (on the parcel): woody stream-side vegetation canopy occupies at least 75% of the stream corridor and canopy cover within woody vegetation patches is least 75%.

  Lower extent or percent cover is acceptable if explained by natural site features that control the site's capability to support vegetation, such as substrate, slope, and aspect. For example vegetation may be sparser on a very steep gradient or on well-drained course alluvium.

- < or = to 40% of relative linear extent of stream-side vegetation comprises cover of non-native woody canopy.
- < or = to 10% of the total relative linear extent of stream-side vegetation comprises cover of invasive woody or herbaceous species.

3) The parcel's stream(s) is contiguous with transitional upland and stream habitats.

   a. The immediately adjacent watershed land (within 500 feet of the stream centerline) is, and will remain, undeveloped or lightly developed on at least one side (immediately adjacent watershed may be farm or ranch land; a stream-side road may be present).

   b. Similar stream habitat occurs either upstream or downstream of the site's largest stream (i.e. the stream is not an isolated fragment).

4) The land is located in a watershed that is associated with streams within the District's jurisdiction.

5) The land is located within the same basin as the impacts to be credited (San Francisco Bay or Monterey Bay basins).

6) The planned long term on-site land use and/or management is consistent with maintenance of good stream condition. Minimum standards or criteria for grazing management and trail routing, particularly within the mitigation credit area, may be formulated as the Program progresses.

7) The land was not already protected under public ownership, under ownership by a private land conservation organization, or under conservation easement prior to the acquisition action to which the District is contributing. (The District may make it's financial contribution within 18 months of the purchase).

8) The land is potentially subject to current or future development or degradation or presents a unique conservation opportunity.

9) The land is not under consideration for purchase for other non-mitigation or enhancement purposes by the District (such as to provide for flood protection). The land may be used for other mitigation or enhancement projects.

10) The land is available from a willing seller.

APPENDIX B

SCVWD STREAM AND WATERSHED PROTECTION PROGRAM PRIORITY EVALUATION CONSIDERATIONS FOR ACQUISITION

SITE-SPECIFIC HABITAT FEATURES

Size and General Descriptive Setting

A. Site size (total)
B. Total mitigation acreage
C. Site location, land use, general topography and relationship to streams, general vegetation description
D. Length, order and perennial or ephemeral status of each stream on entire sites and within mitigation credit area (larger streams and/or perennial streams have higher priority)
E. General stream-related vegetation types
F. General physical features of streams(s)
G. Potential Constraints
H. Other

Features of the Mitigation Credit Area

A. Areas known to be occupied by California red-legged frogs or western pond turtles
B. Biological or natural features consistent with the habitat requirements of the California red-legged frog or western pond turtle present
C. Other special-status species or their potential habitat present
D. Other noteworthy biological or natural features present (e.g., native fisheries, locally rare species or habitats, contribution to maintenance of cool summer water temperatures on site and downstream)
E. Includes erosion/sedimentation problems that will be addressed by an S&WP restoration project

Features of the Remainder of the Parcel (outside the mitigation credit area)

A. Areas known to be occupied by California red-legged frogs or western pond turtles
B. Biological or natural features consistent with the habitat requirements of the California red-legged frog or western pond turtle present
C. Other special-status species or their potential habitat present
D. Other noteworthy biological or natural features present
E. Includes erosion/sedimentation problems that will be addressed by a S&WP restoration project

ACQUISITION TRANSACTION FEATURES

B

1) Potential threats to property if not acquired
2) Protection attained
3) Unique opportunity presented (e.g., multiple contiguous parcels available together, key location to link public lands)
4) Time frame for completion of acquisition
5) Transaction manageability (e.g., contract complexity/agreement monitoring)
6) Amount of mitigation credit generated
7) Other

REGIONAL FEATURES

a) Supports a watershed-wide programmatic approach to maintenance mitigation by maximizing regional, long-term, ecological benefits.
    - Identify whether a target stream is involved
    - Identify links with other land planning, preservation or management efforts (e.g. WMI, FAHCE)
    - Identify other regional, long-term ecological benefits

b) Considers adjacent land uses, ownership, and linkages with other protected lands (current or planned) including mitigation sites and parks in determining site value and function

c) Acquisition program considers watershed position in overall evaluation, and considers potential increased values of lower watershed locations

d) Provides multiple benefits to the public good by supporting other interests of the District or the interests of other agencies, community groups or organizations

e) Other

APPENDIX C

Mock Acquisition Example
Supporting Graphics and Mitigation Credit Area Determination

A "mock parcel" acquisition is presented to illustrate GIS maps and graphics produced during candidate project review and to illustrate the mitigation credit calculation method. The mock parcel is an imaginary, approximately 500 acre partnership acquisition parcel based on a real world location Parcel boundaries; stream locations, orders, and lengths; and the location and sizes of mitigation credit areas will be determined using existing information and maps. Data sources include assessors parcel maps and USGS topographic maps. Most information will be overlain and evaluated with the ArcView GIS program.

Regional Context:

1) **Regional Map** (not shown). The parcel will be shown in it's regional context, showing other streams, parks and open space, nearby cities and other regional features. This map will be similar to an enlarged quadrant of Figure MMRP-2. Unlike a real candidate parcel, the mock parcel location cannot be specified, and no example graphic is provided.

2) **Figure MMRP-3: Vicinity Map.** The parcel is shown in relationship to features in the immediate vicinity on a USGS topographic map or other existing map or aerial photograph. Relevant features such as other public lands, mitigation sites, or developments are shown. In this example, the mock parcel is located directly north of other existing public land and just upstream of a small development.

Site features:

3) **Figure MMRP-4: Site Map.** General site features, such as topography, streams, dirt and paved roads and buildings are shown in more detail on existing available topographic maps or aerial photographs.

Stream identification:

4) **Figure MMRP-5.** The SCVWD 500 scale creeks map and the USGS 2000 scale creeks map show two versions (one more detailed, one less detailed) of stream mapping of the site.

> **4a) SCVWD 500 Scale Creeks.** The SCVWD 500 Scale Creeks map shows all streams on the District GIS layer of the same name. Most of this data was obtained from Barclay Mapworks, Inc., Mountain View, CA, based on hand digitized information from 1" = 500' scale maps. Streams within District jurisdiction (i.e. with watersheds of 320 acres or more) are indicated by bold lines. In this example, the largest stream on the mock parcel is within the District's jurisdiction (indicated by a heavier blue line). Five other streams are tributaries to the larger stream, and several of these have their own tributaries. This data layer provides more detailed background information on streams than USGS maps, but is not used to determine which streams qualify for mitigation credit.

4b) USGS 2000 Scale Map. The USGS 2000 Scale Creeks map shows, in isolation, all streams mapped on a standard USGS 7.5 minute topographic quadrangle map (quad). The stream order of all creeks within the parcel is also shown.

USGS 7.5' quads will be the standard used to identify streams that qualify for mitigation credit under the S&WP Program, and to determine stream order and length. This insures standard mapping regardless of parcel location. The program gains credit from acquisition of 1st order or greater USGS 1:24,000 (2000 scale) creeks. Note that only the largest stream and two of the five tributary streams on the SCVWD 500 scale creeks layer appear on the USGS map. USGS mapping was done at a less detailed scale, and therefore does not include many of the smaller tributaries mapped by the SCVWD layer.

Stream order is determined from the top of the watershed down, using the method of Straher (US NRCS 1998), so that smaller streams with no upstream tributaries are 1st order streams. The mock parcel contains a segment of one 2nd order stream and complete reaches of two 1st order streams.

The full detail USGS quad map (Figure MMRP-4) classifies the largest stream as perennial (solid blue line), and the 2 smaller streams as intermittent (dashed blue line).

Credit Area Determination

5) Figure MMRP-6: Mitigation Credit Area. The mitigation credit zone boundaries around the qualifying USGS mapped streams are determined using GIS (ArcView). Figure MMRP-6 shows the 50 foot zones around two 1st order streams, and the extent of 150 and 500 foot zones around the 2nd order stream (Section 3.2). The amount of acreage within each zone is calculated by the GIS. The corresponding mitigation ratio (10:1 or 15:1) is applied to each area, and the mitigation credit amount is determined (Table 1).

In this example, the mitigation area would comprise 152 acres of the approximately 500 acre parcel (Table 1). The District would contribute funding for 152 acres to the partnership acquisition of the entire parcel. Other partners would contribute the remaining funds. The fee title or easement for the entire parcel would then be held by a park, open space or conservation organization.

The District's contribution to the mock parcel acquisition results in:

a. 12.1 acres of mitigation credit obtained
b. 2.5 miles of stream acquired (equivalent to 2.1 miles of stream per 10 acres of impact)
c. 152.5 acres of stream and immediate watershed land acquired (equivalent to 12.6:1 acquisition to impact ratio)

The actual amount of stream miles and acres acquired per acre impacted will vary based on site features, but would be no less than 10 ac acquired per acre impacted, and 1 mile of stream per 10 acres impacted (Section 3.3).

ATTACHMENT B

GIANT REED CONTROL PROGRAM
MITIGATION AND MONITORING PLAN

Introduction

The Giant Reed Control Program is proposed as mitigation for impacts from vegetation management in streams to 66 acres of riparian vegetation in Santa Clara County. Overall, this component includes removing giant reed (*Arundo donax*) from 125 acres with 66 being credited toward riparian impacts and the additional 59 acres as compensation for lag time in the implementation of other mitigation measures.

Giant reed is a highly invasive non-native species that infests creeks and adjacent habitat throughout Santa Clara County. Giant reed displaces native vegetation thus reducing the quality of riparian habitat. It contributes to localized flooding by blocking channels. It is also highly combustible which heightens fire danger in urbanized streams.

The control program would consist of the removal of giant reed from 125 acres along with associated measures required to implement a comprehensive control program.

Specific Actions Required for Implementation

The specific program implementation measures are listed below. Each component will be explained in more detail. A table showing the schedule of individual components is included in this plan.

- Mapping of giant reed in all major streams in Santa Clara County.
- Creation of a GIS data-base to manage information on mapping and control efforts.
- Prioritization of efforts using mapping data and "target streams" concepts.
- Creation of pilot sites as a tool to create and refine an optimum control program. Pilot sites would use various control methods to determine efficacy of individual methods.
- Removal of 125 acres of giant reed from Santa Clara County streams over a period of ten years. This effort would consist of removal and disposal of bio-mass and initial treatment with an appropriate herbicide.
- Follow-up herbicide treatments for a period of 3-4 years to assure completes control of sites where giant reed has been removed.
- Revegetation of qualified areas where natural recruitment of native species is unlikely to occur and channel constraints do not preclude dense vegetation. A qualified area is defined as an area where terrestrial riparian vegetation would likely be found in an undisturbed system.
- Creation of an outreach program designed to educate landowners and the general public about invasive species in general and about giant reed specifically.
- Participation in county-wide and regional control efforts of giant reed and other invasive species.
- Monitoring and reporting on success criteria attached to the various sub-components of the Giant Reed Control Program.

Mapping and GIS Database Creation

Outbreaks of giant reed throughout the county will be mapped. Figure MMRP-7 shows preliminary mapping data. The goal of mapping is to assess the extent of infestation, prioritize control efforts, and track progress toward control and eradication. The District has started gathering existing information and doing field surveys at a macro level. Additional surveys to refine data and fill in gaps will be performed as the program is brought on line. Where conditions are favorable, aerial photography and remote-sensing technology may be used for data collection. A protocol will be developed for locating and quantifying the size of existing stands of giant reed to ensure consistent data collection. Most data will be collected using GPS technology. Data will be incorporated into a GIS database to facilitate map generation and data analysis. The GIS data will be made available to groups outside the District who are participating in control efforts or conducting research. Mapping may also be done for Tamarisk and Cape Ivy as these are particular species of concern in county watersheds. To the degree that mapping of these species can be accomplished as part of the Giant Reed Program, data will be collected. No commitments are being made for control of other species are being made as part of the program.

Prioritization and Pilot Sites

Concurrent to the mapping effort, the District will identify pilot sites to evaluate a suite of control options. While control of giant reed uses a combination of mechanical and chemical control techniques, there are variables that may be evaluated to optimize the program for both efficiency and protection of resources. Timing of control, varied rates on herbicides, mulching, alternative disposal of bio-mass, and other criteria will be evaluated to continually improve control efforts. The District will also prioritize control efforts based on a number of factors that influence the District's ability to control giant reed within particular geographic boundaries. These criteria are as follows:

- Property Ownership – Control of giant reed will have more success if clearances can readily be gained to control all infestations in a given area. In many cases, the District owns or has easement on land where giant reed is present. In other instances, partnerships will have to be formed with other agencies, municipalities, and private land-owners to facilitate uniform control through an entire watershed. The ability to gain clearances with all involved parties will determine the priority for doing control in those areas in any given season.

- Value of Biological Resources (target streams) – the value of remaining riparian resources and habitat in a given geographic area will determine the priority a particular creek has for control of giant reed. This "target streams" concept originated in the stakeholder process when the various parties acknowledged that certain watersheds in Santa Clara County merit more attention because the remaining habitat and resources are at greater risk if work is deferred. Those creeks that have significant remaining riparian corridor, anadramous fisheries, and other valuable biological resources will receive a higher priority for control because the resources are of higher value and more benefit is to be gained from earlier efforts.

- The Ability to Eradicate Giant Reed within Defined Boundaries – because of the way giant reed spreads, there are opportunities for eradicating the plant in entire watersheds if infestations are limited. Some smaller watersheds have very limited infestations of giant reed or those infestations are grouped together rather than being spread out. In these instances, a few years of control may be able to remove all giant reed from a given watershed with little or no potential for re-infestation. Creeks where this strategy can be implemented will have a higher priority in the overall program.

- Partnerships with other Stakeholders – in some cases, there is another interested stakeholder who may have resources available or may wish to partner with the District for a specific reason. These overtures and opportunities will be given particular attention in order to get the greatest benefit toward program goals.

There may be other priorities developed as the program is implemented, but these will be used for initial implementation.

Initial Control

A total of 125 acres of giant reed will be controlled over a 10-year period. The program is designed to control 10 to 15 new acres of giant reed each year as an average target. Some years may see slightly more acreage controlled, while others may see slightly less. Density of infestation, access to control sites, weather, stream conditions, etc. will play a role in the amount of giant reed controlled in any given year. Initial control will consist of removal of biomass, appropriate disposal of biomass, and treatment of clumps with an approved herbicide. Typical herbicide control would consist of applying glyphosate (primarily in an aquatic formulation) in a concentrated form to freshly cut stumps. The herbicide is taken into the underground portions of the plant and kills the roots. This "cut-stump" control method has proven highly effective at reducing the amount of re-growth. Because it is a topical application, there is a high level of protection afforded to adjacent resources.

Follow-up Control

Control of giant reed requires follow-up herbicide applications to re-growth, particularly on large stands. Typically, the amount of re-growth declines over a period of 2-3 years so that in year 3 or 4, there is nothing remaining of the original stand of giant reed. The program is designed to track control efforts and commits to ongoing control (projected at 3-5 years of treating re-sprouts) to ensure complete kill of stands of giant reed. There may also be opportunities for using other control methods as the size of the infestation is reduced. This strategy gives the best chance for long term eradication of giant reed in the program area.

Revegetation

In areas with significant remaining riparian vegetation, natural re-colonization of the treated site is expected after persistent control of giant reed clumps. Revegetation with site-appropriate native species will be implemented in areas where natural revegetation does not occur or is unlikely to occur due to the absence of adjacent parent stock. Revegetation requirements will be assessed in the following manner:

- Giant reed infests a variety of ecological niches in Santa Clara streams. It occupies areas that would otherwise be open water, wetland, riparian, and in some cases, upland habitat. The need for revegetation will be evaluated by applying ecological criteria to the control site to determine where, and how much, revegetation should occur. An eradication site will be restored to the habitat type that would most likely be present in an undisturbed system.

- During the treatment period (2-4) years on any given site, re-growth or recruitment of native species will be monitored. A determination will be made by a qualified biologist as to whether the control site would have naturally occurring riparian vegetation, whether there is adequate habitat developing naturally or whether active revegetation efforts will be required at the end of the treatment period. Data will be included in the annual report on the amount of native revegetation coming in naturally. The goal of revegetation is to have 40% native cover in the treated area within 5 years after the end of treatment. In areas where ecological indicators dictate that riparian vegetation would be present, this goal may be achieved by planting in an area immediately adjacent to the control site. The rhizomes of giant reed can take years to completely degrade and will effectively inhibit growth of other plants until they have completely decomposed so the removal area may not be able to be planted in the short term.

- Channels will be evaluated using the Maintenance Guidelines to assess whether there is adequate capacity to support additional in-stream vegetation. Large-stature riparian species will not be introduced into areas where there is not adequate capacity to convey flood flows. In areas where capacity would be compromised by heavy, riparian vegetation, revegetation will be limited to smaller stature riparian and herbaceous species. This element will be applied on a site by site basis.

Revegetation will be done in a manner consistent with current design, installation and maintenance practices in order to ensure a high potential of success in areas where revegetation efforts are implemented. The guidelines for revegetation of giant reed control sites will have the following criteria:

- Species selection for revegetation of any given site will be made by evaluating site conditions including soils, hydrology, exposure, adjacent plant community, and appropriate reference data from other locations in the watershed. (A typical species list is included below).

- Planting densities will be determined based on the potential of a given site but will be, in general, 12 feet on center for trees and 6 feet on center for shrubs. Pole cuttings, when used, will be planted 3 feet on center. If direct seeding is used as a planting technique, the same spacing will be used as for container planting.

- Plant material will be planted using installation methods that are standard to the industry i.e. soil preparation, propagule type, local collection, cutting size, etc.

- Revegetation plantings will be irrigated as needed for the 3 year establishment period. The methods chosen to provide irrigation will be included as part of the annual report but the method used is the decision of the District. Selection of irrigation methods will focus on efficient irrigation that meets the horticultural requirements of the site while being cost-effective and implementable. In most cases, automatic irrigation systems will not be used.

- Other maintenance activities performed during the establishment maintenance period will include weed control, browse protection, site inspection, and insect and disease control.

- Plant material will be maintained for three years as a general rule. If plants become established to the degree that maintenance can be curtailed in less than three years, appropriate reductions in maintenance will be made.

- If a site is not established to a degree that maintenance can cease after three years, the District will meet with the appropriate agencies to discuss contingencies and remedial strategies.

- Replanting will be done if a given site does not meet agreed upon success criteria. Replanting does not mean that the establishment period for a site begins anew. New plantings will be subject to the same requirements as the original plants (3 years of maintenance).

- Success criteria for revegetated sites will be 40% native cover of plantings on individual giant reed control sites 5 years after final control work was done. No numerical survival criteria are required under this program other than during the early establishment period. 70% survival of installed container plantings will be required for the three year establishment period. 50% survival of installed pole cuttings will be required for the three year establishment period.

- Monitoring will be done for five years after initial planting. At the end of five years, a final report will be given for each site. If all success criteria have been met at the end of this period, no further monitoring or reporting will be required.
- For the sake of definition, all references to maintenance, monitoring, and reporting are calculated from the date of final control on a given site (no active revegetation) or the date of initial planting (active revegetation).

Typical Revegetation Species List*

Salix laevigata
Salix lasiolepsis
Salix hindsii
Populus fremontii
Quercus lobata
Quercus agrifolia
Sambucus mexicana
Acer negundo
Rosa californica
Rubus ursinus
Leymus triticoides
Artemesia douglasiana
Baccharis salicifolia
Symphoricarpus alba

* - Some or all of the above species may be used at a given revegetation site.

Educational Outreach

The District will develop and distribute educational materials to inform the community about the problem of invasive species, particularly giant reed. This outreach may include some or all of the following:

- Printed literature distributed to public agencies, environmental groups, gardening clubs, nurseries, and the general public.
- Workshops on Managing Invasive Species.
- Public forums on invasive species in Santa Clara county watersheds.
- Monitoring and input on landscaping done near creeks to ensure that invasive species are not introduced in new landscape plantings.

District staff may provide technical assistance to interested county landowners in managing invasive species on their property. All mapping, research information from pilot control sites, and information gathered throughout project implementation, will be made available to the public to assist in additional efforts to control giant reed.

Regional Coordination

Control of giant reed throughout the county's watersheds requires a strategic approach. The District's primary effort will be for District personnel to remove giant reed on 125 acres of District land and non-District land where voluntary fee title or easement can be obtained for the control effort. The District will participate with other agencies and landowners in the county to develop additional giant reed control programs beyond the 125 acres. The District will investigate regional forums, coordination of permitting, joint participation in grants, training of staff, and cost sharing in control efforts.

Monitoring and Reporting

The program will contain ongoing monitoring of various program components with regular reports submitted under the SMP. Monitoring of pilot sites and control sites will occur each year with data incorporated into the annual report for SMP activities. Monitoring of county streams for new infestations will be an ongoing process with the GIS layer being updated as needed. Annual reports will also contain information on revegetation efforts and other relevant data as it pertains to the program.

Staff or Agency Responsible for Implementation

The Unit Head of the Vegetation Management Unit at the Santa Clara Valley Water District is the designated staff responsible for implementation of this mitigation measure.

Timing of Implementation

A schedule for implementation of each component of this program is included as a separate appendix in this document.

Specific Performance Criteria to Ensure Success of Implementation

Certain time/critical elements may be evaluated as follows:

- Mapping of all existing stands of giant reed in Santa Clara County within the first two years of the program.
- Creation of a GIS data layer showing the location of giant reed locations within the first two years of the program.
- Control of 50 acres of giant reed within 5 years of program implementation.
- Control of 100 acres of giant reed within 10 years of program implementation.
- Revegetation of qualified sites within one year after the cessation of control efforts on a given site.
- Presentation of one workshop or conference on invasive species per year.

Timing of Monitoring and Reporting

The District will submit an annual report on the implementation of the various mitigation components as part of the reporting component outlined in the Stream Maintenance Program. This report will contain information on the progress made on individual components of the Giant Reed Control Program within the last calendar year. Specific information might include: location of control sites, amount of giant reed controlled, control techniques used, revegetation efforts (if any), date of workshops held, and potential control or revegetation sites for the upcoming year. Reporting may also include field tours of representative control sites and/or mitigation sites. Reports will be submitted to USACE, United States Fish and Wildlife Service (USFWS), CDFG, BCDC, and RWQCB as agreed to in the Stream Maintenance Program. This report will be submitted on the same dates as other reporting commitments made in the Stream Maintenance Program.

APPENDIX C:

BEST MANAGEMENT PRACTICES (BMP) TABLE

BEST MANAGEMENT PRACTICES
UNDER THE STREAM MAINTENANCE PROGRAM

Revised: May 17, 2002

Introduction

The District will process all routine stream maintenance activities according to the process and protocols established in Chapter 3 of the Stream Maintenance Program (SMP). The Resource Protection Protocol contained therein includes a step in the annual review process to identify appropriate Best Management Practices (BMPs) for the design and implementation of an activity. (See SMP Figure 3-1.) BMPs are methods that protect environmental quality or reduce environmental impacts from stream maintenance activities. In order to be effective, BMPs must be properly selected and implemented, applied consistently, and their effectiveness evaluated onsite to assure that they are meeting the required objective. The District's Geographic Information System (GIS) will be developed and enhanced to facilitate the stream maintenance project environmental review, processing, and implementation process, particularly for determining potential presence of sensitive species.

Not every BMP is designed to be used in every situation. Since BMPs are meant to be specific to particular activities and resources, the selection and implementation of an appropriate set of BMPs for each project is a key element to their effectiveness. Because of variation in District facilities and the tendency of individual site conditions to change over time, conditions under which each BMP must be applied cannot be strictly prescribed. The staff involved in design and implementation of the maintenance activity must retain some flexibility to determine which BMPs should be implemented according to design objectives and site conditions.

Selection, implementation, monitoring, and improvement of BMPs are all part of the program. Following is a brief discussion of how each of these activities will be applied under the Stream Maintenance Program to assure that resource protection goals are met.

Selection of Best Management Practices

The District will use the most current BMPs when planning or designing routine stream maintenance activities. Work within the Stream Maintenance Program can be divided into two general categories. Regularly scheduled work (most vegetation management, trash pick-up, etc.) is work that occurs in the same place and the same manner with a predictable frequency. Other routine work is not undertaken on a regular annual schedule, but is done as the need arises. This work (sediment removal, bank protection) has a less predictable frequency and location. This work is identified through field surveys, prioritized, and then a work-plan for that particular job is developed. Selection of BMPs will be managed differently for these two types of work.

Selection of BMPs for regularly scheduled work will be done at the beginning of each season (coincides with activity type). Aquatic herbicide application, for example occurs in late summer/early fall. At the beginning of the season, technical staff will review all of the work areas and select appropriate BMPs to respond to site conditions. The BMPs will be incorporated into the work order. If there are questions regarding specific environmental issues, appropriate staff will be consulted and their input will be incorporated.

For work not on a regular schedule, BMP selection is called out in the Resource Protection Protocol. The watershed engineer will, as part of the project design criteria, select BMPs that are

appropriate to the particular job and incorporate them into the design package. The BMPs will be called out in the design documents and incorporated into the work order. If there are questions regarding specific environmental issues, appropriate staff will be consulted and their input will be incorporated.

Implementation of Best Management Practices

Best Management Practices will be implemented by lead staff assigned to a specific project. For most projects this would be the Senior Maintenance Worker. The BMPs will be implemented as they are called out in the work order. If site conditions or other factors require a BMP to be changed or make it no longer relevant to the project, the assigned lead on the job will consult with appropriate staff (watershed engineer, qualified environmental staff, etc.) and get authorization to modify the BMPs. Modifications to BMPs will be noted as an addendum to the work order.

Monitoring of Best Management Practices

Monitoring of BMPs will be carried out as part of the work and assigned to the lead staff on a particular project as a general rule. Exceptions would be where the individual BMP requires a particular field of expertise to carry out the monitoring (i.e. water quality sampling, fisheries monitoring). In that instance, qualified staff would be included in the work order as a resource for BMP implementation.

Changes in Best Management Practices

The Best Management Practices section of the Stream Maintenance Program is intended to be a living document and to change over the life of the program. The annual Resource Protection Protocol in Chapter 3 of the Stream Maintenance Program includes a "lessons learned" step to evaluate and improve all aspects of the maintenance program, including the BMPs. As BMPs are used and ways are seen to improve their effectiveness, they will be modified to reflect the changes. As new BMPs are found or technology improves, the program will incorporate them to further protect resources.

Reporting on Best Management Practices

Reporting on modification to BMPs made as a result of the "lessons learned" process will be done as part of the normal reporting practices called out in the Stream Maintenance Program.

Supporting Documents

The BMPs are supported by other District documents that provide more specificity for maintenance project design and implementation.

These documents are attached to the SMP:

Appendix C. Nesting Migratory Bird Procedure
Appendix D. Dryback/Fish Relocation Protocol
Appendix E. Programmatic Impact Assessment and Mitigation for Routine Bank Protection Activities

These documents are available from the District:

District Channel Maintenance Guidelines
Bay Area Stormwater Management Agency Association BMPs (2001)

BMP List

The list of BMPs gives a BMP identification number which is used for reference in the SMP and EIR, followed by a short BMP Title, a summary Description of the measure, and the Activity to which the measure will generally apply. The abbreviation for activity is:

General	All Routine Maintenance [in activity column, "all" = "general"]
SR	Sediment Removal
VM	Vegetation Management
BP	Bank Protection
MM	Minor Maintenance

GENERAL

BMP	Title	Description
0.1	Instream Work Window	In-stream sediment removal and bank protection work shall be from June 15 to October 30th or the first significant rainfall after October 15, whichever occurs first. (Significant rainfall is defined as 0.5 inch of rain in a 24-hour period). Once significant rainfall occurs, all diversion structures shall be removed and the project site winterized to prevent erosion. No new instream sediment removal and bank protection work shall start after October 15th of any year, and projects started before October 15, shall be at least 50% complete by October 15th to continue work until October 30th or first significant rainfall. Minor activities will be done in-channel at any time of year if the activity is necessary to provide immediate flood protection. These activities include removal of trash or debris that will impede flows, trash rack cleaning, and pier nose cleaning. These activities will be done in a manner that is sensitive to protection of aquatic resources. Removal of in-stream vegetation by hand can be undertaken between July 1 and March 1.
0.2	Minor Work	No reporting or mitigation will be required for minor work activities which remove less than 0.01 acres of wetland and woody riparian vegetation. An equivalent area of mitigation will be provided for annual amounts greater than 0.2 acres of wetland and riparian vegetation removed by minor work activities. Individual minor work activities which affect more than 0.05 acres of wetland and woody riparian vegetation will require separate approval and mitigation. These limitations exclude those minor work activities which occur in the same area as major sediment removal and vegetation management areas included in the program as shown in Figure II-5 of the Final EIR.
1.6	Use of Wheel and Track Mounted Vehicles in Stream Bottoms	District personnel shall use the appropriate equipment for the job that minimizes disturbance to the stream bottom. Appropriately-tired vehicles, either tracked or wheeled, shall be used depending on the situation: 1. Tracked vehicles (bulldozers, loaders) may cause scarification. 2. Wheeled vehicles may cause compaction. 3. Heavy equipment shall not operate in the live stream (see also BMP 1.3).

BMP	Title	Description
2.1	Minimize Vegetation Removal	Vegetation control and removal in channels, on streambanks, and along levees and maintenance roads shall be limited to removal necessary for facility inspection purposes, removal that is necessary to meet regulatory requirements, removal that is required to comply with fire codes, and removal that is required to meet capacity requirements per Maintenance Guidelines. 1. The District has developed detailed Maintenance Guidelines to address the ongoing need for maintenance of vegetation or sediment in modified streams and channels. The guidelines are engineering-based and outline the level of maintenance required to ensure adequate flood protection capacity is maintained in the streams and canals within the District's jurisdiction. 2. Decisions regarding the necessity of routine sediment removal and vegetation management activities (to restore channel flow capacities) shall be made following the thresholds established in the guidelines. This information shall be used to formulate in part an annual routine maintenance work plan.

BMP	Title	Description
3.1	Minimize Impacts to Special-status Plants and Animals Via Site Assessments and Avoidance Measures	To avoid and minimize impacts to special-status plant and wildlife species, the annual work program shall be reviewed by biological staff, and each site where special status species have been found, have been known to exist in the recent past, or are likely to occur because suitable habitat exists, be visited by a biologist or qualified personnel under the direction of a biologist. For animal species the site surveys shall be no more than 30 days prior to the start of construction, to determine presence of special-status species. For mobile species (e.g. red-legged frog, western pond turtle, least Bell's vireo, steelhead), which may occur on-site during the work period, surveys be conducted as close to the start of work as is practical (no more than 7 days prior to start of work). For plant species, the surveys be conducted during the appropriate time of the year to determine presence. Information regarding the presence of special-status species on a particular worksite shall be based on the District's GIS database and professional experience of qualified staff. 1. The District shall use its GIS database to identify potential special-status plant and animal habitats. All projects falling within sensitive habitats shall be discussed with biological staff to identify avoidance and minimization measures. 2. All populations detected during the surveys shall be assessed and mapped. This information shall be entered into the District's GIS system for future management purpose. 3. Avoidance of impacts to serpentine areas or other sensitive plant habitats may include storing removed sediment offsite, limiting the method of vegetation removal to manual methods, and limiting the operation of maintenance equipment to established roads whenever possible. 4. Vegetation management in sensitive plant areas shall use only hand control or backpack herbicide application by operators trained to identify and avoid the species to be protected. 5. If sensitive animals such as western pond turtles or California red-legged frogs are found, a qualified biologist will remove them to suitable habitat outside of the project limits. Moving animals will be consistent with applicable Fish and Wildlife Service and Fish and Game permits. 6. If maintenance activities are scheduled in the vicinity of extant populations, qualified biological personnel shall clearly identify the populations on site and stake or flag a buffer zone around the population in which activities are to be avoided. 7. The results of all sensitive species surveys shall be reported to the Fish and Wildlife Service, National Marine Fisheries Service and the California Department of Fish and Game in an annual report. All surveys will be reported to the California Natural Diversity Database. 8. The District shall develop and distribute informational pamphlets entitled "Sensitive Plants, Wildlife, and Fish at your Worksite." These pamphlets are designed to inform staff about sensitive species and environmental protocols and procedures.

BMP	Title	Description
		9. If sensitive species are found on the site during pre-construction surveys, then the project biologist shall conduct additional monitoring of the work site during construction.
3.2	Minimize Impacts to Nesting Birds Via Site Assessments and Avoidance Measures	District personnel shall conduct SMP work in a manner consistent with the protocols established by the most current version of the District's Nesting Migratory Bird Procedure: 1. Project areas shall be checked by a qualified biologist for nesting birds prior to starting work if the work has the potential to impact nesting birds. 2. If nesting Raptors are found, a 300-foot buffer shall be established around the nest and maintained until the young have fledged. If other nesting birds are found, implementation of a project may be delayed until after nesting is completed. Work may occur if an adequate buffer, as determined by a qualified biologist, can be established between the maintenance activity and nests.
3.3	Avoid serpentine habitat	The District shall identify serpentine areas and avoid disturbance to these areas to the extent possible. 1. The District shall use its GIS database to identify serpentine areas near work areas and avoid and minimize impacts to all stands of native vegetation that may provide suitable habitat for special-status plants and invertebrates to the greatest extent possible. 2. Avoidance measures may include storing removed sediment offsite, limiting the amount of vegetation to be sprayed and removed in serpentine areas, and limiting the operation of maintenance equipment to established roads whenever possible. 3. Facilities crossing serpentine soil grasslands shall be permanently marked in the field (and in the District GIS) and shall include 100 ft. buffer zones. No upland herbicides shall be used in these marked areas. Aquatic herbicides may be used after July 1. Upland vegetation control using hand labor may occur after June 15. 4. Facilities crossing serpentine soil shrub lands and woodlands shall be surveyed by a qualified botanist. Areas supporting sensitive species shall be permanently marked in the field (and in the District GIS) and shall include 100 ft. buffer zones. No upland herbicides shall be used in these marked areas. Aquatic herbicides may be used after July 1. The botanist shall determine what area's vegetation management using hand labor may occur after June 15. Buffer zones around individual plants or populations shall be established

BMP	Title	Description
3.19	Develop a Biodiversity Monitoring Program	The District commits to developing and implementing a biodiversity monitoring program in conjunction with the focus of the program shall be on special-status species and their habitats. Monitoring results shall be incorporated into future BMP and maintenance design through the "lessons learned" process of annual review (refer to SMP Figure 3-1) so as to more effectively conserve and restore stream habitats. 1. Monitoring protocols for sensitive species shall be approved by the Fish and Wildlife Service, National Marine Fisheries Service or California Department of Fish and Game as appropriate. 2. The results of all sensitive species monitoring shall be reported to the Fish and Wildlife Service, National Marine Fisheries Service and the California Department of Fish and Game in an annual report. All surveys will be reported to the California Natural Diversity Database. 3. Monitoring shall be conducted during the appropriate time of year for each species under investigation. 4. All populations detected during the monitoring shall be assessed and mapped. This information shall be entered annually into the District's GIS system for future management purposes. 5. Sensitive species monitoring shall cover the following species: Salt Marsh Harvest Mouse - population, habitat mapping and trend; Western Snowy Plover - population, distribution and trend; California Clapper Rail - distribution and trend; Least Bell's Vireo - monitor revegetation sites and identify new sites; California Red-Legged Frog - distribution, population and trend; California Tiger Salamander - distribution, abundance and trend; Steelhead - population, distribution and trend; Chinook Salmon - population, distribution and trend; Bay Checkerspot Butterfly - population, distribution and trend; Tiburon Paintbrush, Coyote Ceanothus, Santa Clara Dudleya, Metcalf Canyon Jewelflower and Mt. Hamilton Thistle - population, distribution and trend; Raptors - nest locations; Salt Marsh Yellowthroat - distribution; Alameda Song Sparrow - distribution; Burrowing Owl - distribution, abundance and trend. 6. The figure "Fisheries present in streams within jurisdiction of the Santa Clara Valley Water District" (Figure IVB-1) shall be updated every 5 years. 7. The District shall complete the development of the biodiversity monitoring program within 1 year of the permits being issued. 8. Surveys for listed species shall be conducted by individuals authorized by the Fish and Wildlife Service and/or California Department of Fish and Game as appropriate.

BMP	Title	Description
4.1	Notify Local Governments of Scheduled Work	Notify cities and the County of proposed work by submitting the Annual Work Plan to the Public Works Departments and the District's Zone Advisory Committee.
4.2	Minimize Disturbances to Surrounding Neighborhoods	The District shall implement maintenance practices that minimize disturbances to neighborhoods surrounding work sites. 1. In general, work shall be conducted during normal working hours. Extending weekday hours and working weekends may be necessary to complete some projects. 2. Internal combustion engines shall be equipped with adequate mufflers. 3. Excessive idling of vehicles will be prohibited. 4. Levee traffic shall be limited to a speed of 15 miles per hour. 5. Access roads shall be watered as needed to control dust. 6. Dry sediment shall be wetted down or covered as needed to control dust during transport.
4.4	Sanitary/Septic Waste Management	Temporary sanitary facilities shall be located on jobs that last multiple days. All temporary sanitary facilities shall be placed outside of the creek channel and flood plain.
4.5	Vehicle and Equipment Cleaning	District vehicles shall be washed only at the approved area in the corporation yard. No washing of vehicles shall occur at job sites.
4.6	Work Site Solid Waste Management	District employees and contractors shall clean the work site before leaving by removing all litter and construction related materials. The District's maintenance crews shall be responsible for all debris incurred as a result of construction and for cleaning up dumped material.
4.8	Implement Public Safety Measures	The District shall implement public safety measures during maintenance: 1. Construction signs shall be posted at job sites warning the public of construction work and to exercise caution. 2. When necessary, a person shall be provided for traffic control. 3. If needed, a lane shall be blocked off to allow for trucks to pull into and out of the access points. 4. Where work is proposed adjacent to a recreational trail, warning signs shall be posted several feet beyond the limits of work. 5. Fencing, either the orange safety type or chain link, shall be installed above repair sites on bank stabilization projects.

BMP	Title	Description
4.9	Notify Park Departments of Trail Closures	As part o the Annual Work Plan, the District will notify the part departments of trails that could be subject to closure. The type of work, location and duration of each project that will affect trail closures will be identified.
6.1	Spill Prevention	The District shall prevent the accidental release of chemicals, fuels, lubricants, and non-storm drainage water into channels. 1. District field personnel shall be appropriately trained in spill prevention, hazardous material control, and clean-up of accidental spills. 2. No fueling, repair, cleaning, maintenance, or vehicle washing shall be performed in the creek channel or in areas at the top of the channel bank that may flow into the creek channel.
6.2	Spill Kit Location	Spill prevention kits shall always be in close proximity when using hazardous materials (e.g., crew trucks and other logical locations). 1. Prior to entering the work site, all field personnel shall know the location of spill kits on crew trucks and at other locations within District facilities. 2. All field personnel shall be advised of these locations and trained in their appropriate use.
6.3	Hazardous Materials Management	The District shall implement measures to ensure that hazardous materials are properly handled and the quality of water resources is protected by all reasonable means when removing sediments from the streams. 1. Prior to entering the work site, all field personnel shall know how to respond when toxic materials are discovered. 2. The discharge of any hazardous or non-hazardous waste as defined in Division 2, Subdivision 1, Chapter 2 of the California Code of Regulations shall be conducted in accordance with applicable State and federal regulations. 3. All handling and disposal of sediments shall be performed in accordance with the WDR issued by the RWQCB. The sediment shall ultimately be disposed at a permitted landfill. Any alternative use or disposal shall require RWQCB approval.
6.4	Vehicle and Equipment Fueling	No fueling shall be done in the stream channel or immediate flood plain, unless equipment stationed in these locations is not readily relocated i.e., pumps, generators. For stationary equipment that must be fueled on site, containment shall be provided in such a manner that any accidental spill of fuel shall not be able to enter the water or contaminate sediments that may come in contact with water. Any equipment that is readily moved out of the channel shall not be fueled in the channel or immediate flood plain. All fueling done at the job site shall provide containment to the degree that any spill shall be unable to enter the channel or damage stream vegetation .

BMP	Title	Description
6.5	Vehicle and Equipment Maintenance	No equipment servicing shall be done in the stream channel or immediate flood plain, unless equipment stationed in these locations cannot be readily relocated (i.e., pumps, generators). 1. Any equipment that can be readily moved out of the channel shall not be serviced in the channel or immediate flood plain. 2. All servicing of equipment done at the job site shall provide containment to the degree that any spill shall be unable to enter the channel or damage stream vegetation. 3. If emergency repairs are required in the field, only those repairs necessary to move equipment to a more secure location shall be done in the channel or flood plain. 4. If emergency repairs are required, containment shall be provided equivalent to that done for fueling or servicing.
6.6	Employee/ Contractor Training	All appropriate District staff and contractors shall receive annual training on Stream Maintenance Program BMPs.

BMP	Title	Description
7.1	Discovery of Cultural Remains or Historic Artifacts	Work in areas where remains or artifacts are found will be restricted or stopped until proper protocols are met. 1. Work at the location of the find will halt immediately within 50 feet of the find. A "no work" zone shall be established utilizing appropriate flagging to delineate the boundary of this zone, which shall measure at least 50 feet in all directions from the find. 2. The District shall retain the services of a Consulting Archaeologist, who shall visit the discovery site as soon as practicable, and perform minor hand-excavation to describe the archaeological resources present and assess the amount of disturbance. 3. The Consulting Archaeologist shall provide to the District and the Corps, at a minimum, written and digital-photographic documentation of all observed materials, utilizing the guidelines for evaluating archaeological resources for the California Register of Historic Places (CRHP) and National Register of Historic Places (NRHP). Based on the assessment, the District and Corps shall identify the CEQA and Section 106 cultural-resources compliance procedure to be implemented. 4. If the find appears to not meet the CRHP or NRHP criteria of significance, and the Corps archaeologist concurs with the Consulting Archaeologist's conclusions, construction shall continue while monitored by the Consulting Archaeologist. The authorized maintenance work shall resume at the discovery site only after the District has retained a Consulting Archaeologist to monitor and the Watershed Manager has received notification from the Corps to continue work. 5. If the find appears significant, avoidance of additional impacts is the preferred alternative. The Consulting Archaeologist shall determine if adverse impacts to the resources can be avoided. 6. When avoidance is not practical (e.g., maintenance activities cannot be deferred or they must be completed to satisfy the SMP objective), the District shall develop an Action Plan and submit it to the Corps within 48 hours of Consulting Archaeologist's evaluation of the discovery. The action Plan may be submitted via e-mail (rstradford@spd.usace.army.mil). The Action Plan is synonymous with a data-recovery plan. It shall be prepared in accordance with the current professional standards and State guidelines for reporting the results of the work, and shall describe the services of a Native American Consultant and a proposal for curation of cultural materials recovered from a non-grave context. 7. The recovery effort will be detailed in a report prepared by the archaeologist in accordance with current archaeological standards. Any non-grave artifacts will be placed with an appropriate repository. 8. In the event of discovery of human remains (or the find

BMP	Title	Description
		consists of bones suspected to be human), the field crew supervisor shall take immediate steps to secure and protect such remains from vandalism during periods when work crews are absent.) 9. The District or the Consulting Archaeologist shall immediately notify the Santa Clara County Coroner and provide any information that identify the remains as Native American. If the remains are determined to be from a prehistoric Native American, or determined to be a Native American from the ethnographic period, the Coroner shall contact the Native American Heritage Commission (NAHC) within 24 hours of being notified of the remains. The NAHC then designates and notifies within 24 hours a *Most Likely Descendant* (MLD). The MLD has 24 hours to consult and provide recommendations for the treatment or disposition, with proper dignity, of the human remains and grave goods. 10. Preservation in situ is the preferred option. Human remains shall be preserved in situ if continuation of the maintenance work, as determined by the Consulting Archaeologist and MLD, will not cause further damange to the remains. The remains and artifacts shall be documented and the find location carefully backfilled (with protective geo-fabric if desirable) and recorded in District project files. 11. Human remains or cultural items exposed during maintenance that cannot be protected from further damage shall be exhumed by the Consulting Archaeologist at the discretion of the MLD and reburied with the concurrence of the MLD in a place mutually agreed upon by all parties.
7.2	Review of Projects with Native Soil	A cultural resources specialist will conduct a review and evaluation of those sites that would involve disturbance / excavation of native soil previously undisturbed by contemporary human activities to determine their potential for affecting significant cultural resources. The evaluation of the potential to disturb cultural resources will be based on an initial review of archival information provided by the California Historical Resources System/Northwest Information Center (CHRIS/NWIC) in regard to the project area based on a 0.25 mile search radius. It is recommended that this initial archival review be completed by a professional archaeologist who will be able to view confidential site location data and literature to arrive at a preliminary sensitivity determination. If necessary, a further archival record search and literature review (including a review of the Sacred Lands Inventory of the Native American Heritage Commission); and a field inventory of the project area will be conducted to determine the presence/absence of surface cultural materials associated with either prehistoric or historic occupation. The results along with any mitigation and/or management recommendations would be presented in an appropriate report format and include any necessary maps, figures, and correspondence with interested parties. A summary table indicating appropriate management actions (e.g., monitoring during

BMP	Title	Description
		construction, presence/absence testing for subsurface resources; data recovery, etc.) will be developed for each project site reviewed. The management actions will be implemented on site to avoid significant effects to cultural resources.

SEDIMENT REMOVAL

BMP	Title	Description
1.2	Tidal Work Areas	For tidal areas, a downstream cofferdam shall be constructed to prevent the work area from being inundated by tidal flows. By isolating the work area from tidal flows, water quality impacts are minimized. Downstream flows continue through the work area and through pipes within the cofferdam. 1. Installation of coffer dams shall begin at low tide. 2. Waters discharged through tidal coffer dam bypass pipes shall not exceed 50 NTUs over the background levels of the tidal waters into which they are discharged. 3. Coffer dams in tidal areas may be made from earthen material. If earth is used, the downstream and upstream faces shall be covered by a protected covering (e.g., plastic or fabric) if needed to minimize erosion.

BMP	Title	Description
1.3	Dewater/ Bypass Water at Non-tidal Sites	When work in a flowing stream in unavoidable, the entire streamflow shall be diverted around the work area by a barrier. Construction of the barrier shall normally begin in the upstream area and continue in an downstream direction, and the flow shall be diverted only when construction of the diversion is completed. The water diversion plan shall allow stream flows to gravity flow around or through the work site using temporary culverts or stream flow is pumped around the work site using pumps and screened intake hoses. Coffer dam construction shall be adequate to prevent seepage into or from the work area. Coffer dams shall be constructed of river run gravel with a fines content that is less than 15%. Fines are defined as material that is able to pass through a #20 sieve. Coffer dams may also be constructed of sheet piles, inflatable dams, and sand bags. Coffer dams shall be installed both upstream and downstream not more than 100 feet from the extent of the work areas. In-channel berms that only deflect water to one side of the channel during sediment removal, may be constructed of channel material. The enclosure and the supportive material shall be removed when the work is completed and the removal shall normally proceed from downstream in an upstream direction. Normal flows shall be restored to the affected stream immediately upon completion of work at that location. 1. All water shall be discharged in a non-erosive manner (e.g., gravel or vegetated bars, on hay bales, on plastic, on concrete, or in storm drains when equipped with filtering devices, etc.). 2. Sumps or basins may also be used to collect water, where appropriate (e.g., in channels with low flows). 3. Where feasible and appropriate, diversion structures shall be installed on concrete sections of the channels or constructed of materials specified above. Earth fill shall not be used for cofferdams in non-tidal areas. 4. In conjunction with diversion structures, pumps or gravity-fed pipe systems are used to de-water sites. 5. Depending on the channel configurations, sediment removal may occur where the flows are not bypassed around the work site; as long as during excavation activities, a berm of sediment is left between the work area and stream flows to minimize water quality impacts. 6. Diversions shall maintain ambient stream flows below the diversion, and waters discharged below the project site shall not be diminished or degraded by the diversion.

BMP	Title	Description
1.4	Avoid Erosion When Restoring Flows	All temporary diversion structures and the supportive material shall be removed when the work is completed, but no more than 48 hours after work is completed. The removal shall normally proceed from downstream in an upstream direction. Normal flows shall be restored to the affected stream immediately upon completion of work at that location. Flows shall be restored in a manner that minimizes erosion. 1. When diversion structures are removed, to the extent practicable, the ponded flows shall be directed into the low-flow channel within the work site to minimize downstream water quality impacts. 2. Flows shall gradually be restored to the channel to avoid a surge of water that would cause erosion or scouring. 3. Bypassed flows may be slowly reintroduced into the dewatered area by leaving a silt barrier in place to allow water to slow and drop sediment to the extent possible.
1.7	Pump/ Generator Set Operations and Maintenance	Pumps and generators shall be maintained and operated in a manner that minimizes impacts to water quality and aquatic species. 1. Pumps and generators shall be maintained according to manufacturers' specifications to regulate flows to prevent dryback or washout conditions. 2. Pumps shall be operated and monitored to prevent low water conditions, which could pump muddy bottom water, or high water conditions, which creates ponding. 3. Pump intakes shall be screened to prevent uptake of fish and other vertebrates.
1.8	Handle Sediments So As to Minimize Water Quality Impacts	Sediments shall be stored and transported in a manner that minimizes water quality impacts. 1. Wet sediments may be stockpiled outside of a live stream or may be stockpiled within a dewatered stream so water can drain or evaporate before removal. This measure applies to saturated, not damp, sediments and depends upon the availability of a stockpile site. 2. For those stockpiles located outside the channel, water draining from them shall not be allowed to flow back into the creek or into local storm drains that enter the creek, unless water quality protection measures recommended by the RWQCB are implemented. 3. Trucks may be lined with an impervious material (e.g., plastic), or the tail gate blocked with dry dirt or hay bales, for example, or trucks may drain excess water by slightly tilting their loads and allowing the water to drain out. 4. Water shall not drain directly into channels (outside of the work area) or onto city streets without providing water quality control measures. 5. Streets shall be cleaned of mud and/or dirt by street sweeping, as necessary, and not by hosing down the street.
1.9	Soil Stockpiles	If soil is to be stockpiled, no run-off shall be allowed to flow back to creek.

BMP	Title	Description
1.12	Groundwater Management	If high levels of groundwater in a work area are encountered, the water is pumped out of the work site. If necessary to protect water quality, the water shall be directed into specifically constructed infiltration basins, into holding ponds, or onto areas with vegetation to remove sediment prior to the water re-entering a creek. Water pumped into vegetated areas shall be pumped in a manner that will not create erosion around vegetation.
1.13	Prevent Scour Downstream of Sediment Removal	Sites in the transport zone on alluvial fans may cause increased scour downstream if they experience rapid sediment accumulation after sediment removal. Channel reaches up to 500 feet downstream from such sediment removal sites shall be monitored to determine whether accelerated erosion is occurring. If downstream monitoring indicates that erosion is occurring, then remedial action such as rock vortex weirs or similar protection shall be carried out.

BMP	Title	Description
2.2	Minimize Stream Access Impacts	District personnel shall use existing access ramps and roads where possible. If temporary access points are necessary, they shall be constructed in a manner that minimizes impacts to streams: 1. Temporary project access points shall be created as close to the work area as possible to minimize running equipment down stream channels and shall be constructed so as to minimize adverse impacts, such as tree removal. 2. When temporary access is removed, remaining disturbed soil shall be stabilized and seeded immediately after construction. 3. Any temporary fill used for access shall be removed upon completion of the project. Channel topography and geometry shall be restored to pre-project conditions to the extent possible.
2.7	Seeding	For banks that are scraped during sediment removal, an erosion control seed mix shall be used. 1. A typical mix may consist of California native grasses (e.g., *Hordeum brachyantherum*, *Elymus glaucus* 'Berkeley,' *Bromus carinatus*) on slopes flatter than 3:1. *Vulpia microstachyes* may be added to the mix where slopes are steeper (e.g., 2:1). 2. Another seed mix may be of 'Escort' sterile wheat to provide a year's worth of protection. This mix is used only if further work is required the following year. 3. Temporary earthen access roads will be seeded when site and horticultural conditions are suitable.

BMP	Title	Description
3.4	Mitten Crab Control Measures	Sediment from the San Francisco Bay Watershed, including that for reuse, will not be removed to areas any farther south than Metcalf Road in south San Jose. This measure is to avoid transporting mitten crabs, a highly invasive, exotic species, to areas where they are not currently found.
3.6	Remove Sediment from One Side of Large Channels in Alternate Years	Some channels are large in the sense that sediment removal operations must be conducted from both sides of the channel. Remove sediment in large channels from one side only in alternate years to minimize vegetation removal and retain emergent vegetation, which is used for food, cover, fish spawning and nursery areas, and wildlife movement corridors. According to the Maintenance Guidelines, this measure applies to the following channel reaches (Station Nos.): 1. Stevens Ck. (0+00–146+00) 2. Calabazas Ck. (0+00–102+00) 3. San Tomas Ck. (0+00–151+40) 4. Alamitos Ck. (42+65–218+00) 5. Guadalupe River (230+00–387+50) 6. Berryessa Ck. (0+00–200+00) 7. Lower Penitencia (0+00–40+00) 8. Silver Ck. (100+00–315+40) 9. Thompson Ck. (0+00–48+00)
3.7	Salvage Native Aquatic Vertebrates from Dewatered Channels	If fisheries or native aquatic vertebrate are present when cofferdams, water bypass structures, and silt barriers are to be installed, a fish and native aquatic vertebrate relocation plan shall be implemented to ensure that fish and native aquatic vertebrates are not stranded: 1. In non-tidal channels, where water is to be diverted, prior to the start of work or during the installation of water diversion structures, native aquatic vertebrates shall be captured in the work area and transferred to another reach as determined by a qualified biologist (refer to Fish Relocation Guidelines) 2. Aquatic invertebrates will not be transferred (other than incidental catches) because of their anticipated abundance and colonization after completion of the repair work.

BMP	Title	Description
3.8	Minimize Effects of Bypass Structures on Steelhead	1. To prevent increases in temperature and decreases in dissolved oxygen (DO), if bypass pipes are used, they shall be properly sized (i.e., larger diameter pipes to better pass the flows). Bypass pipes may also be avoided by creating a low-flow channel or using other methods to isolate the work area. 2. In Non-tidal Areas, diversions on the Guadalupe River, Calero, Los Gatos, Guadalupe, Alamitos, Coyote, Upper Penitencia, Stevens, San Francisquito, Bodfish, Little Arthur, Uvas and Llagas Creeks shall maintain conditions required for fish passage. Diversions shall maintain fish passage when the project meets the following conditions: 1) the length of the area dewatered exceeds 500 feet, and/or 2) the length of time the stream is dewatered exceeds two weeks in length. Conditions for fish passage shall be met as long as the diversion 1) maintains contiguous flows through a low flow channel in the channel bed or an artificial open channel, 2) presents no vertical drops exceeding six (6) inches and follows the natural grade of the site, 3) maintains water velocities that shall not exceed eight feet per second (8 ft/sec), and 4) maintains adequate water depths consistent with normal conditions in the project reach. An artificial channel used for fish passage shall be lined with cobble/gravel. A closed conduit pipe shall not be used for fish passage. The inlets of diversions shall be checked daily to prevent accumulation of debris.
3.10	Conduct In-Channel Work During the Dry Season	Avoid and minimize impacts to salmonids by timing stream maintenance projects in streams where there are or could be salmonids so that the use of heavy equipment in the channel is conducted outside of the migration and spawning season. 1. Minor maintenance activities that occur above ordinary high water and do not impact the riparian corridor may be done at any time of the year. These activities include fence repair, graffiti removal, revegetation maintenance, rodent control, etc. 2. Minor activities will be done in channel if the activity is necessary to provide immediate flood protection. These activities include removal of trash or debris that will impede flows, trash rack cleaning, and pier nose cleaning. These activities will be done in a manner that is sensitive to protection of aquatic resources.

BMP	Title	Description
3.11	Avoid Dewatering an Entire Isolated Stream Reach	Construction sites may be isolated by upstream or downstream barriers, such as culverts. In reaches that contain deep pools, the District shall maintain these pools as refuges by constructing temporary fencing so as to avoid pool destruction when preservation of the pool is not in the construction footprint or a barrier to project access. This BMP does not apply to sediment removal activities that require the removal of all sediment to restore the design capacity.
3.12	Maintain Low-flow Fish Passage	If a nontidal stream channel has been altered during the operations, its low flow channel shall be returned as nearly as possible to its approximate prior location with appropriate depth for fish passage without creating a possible future bank erosion problem.
3.13	Remove Temporary Fills as Appropriate	Temporary fills, such as for access ramps, diversion structures, or cofferdams, shall be completely removed upon finishing the work.
3.15	Restore Pool Configuration of Channel Bottom	The District shall re-grade the channel bottom at the end of the work project to as close to original conditions as possible. 1. In areas used for migration by salmonids as designated on the District GIS Fisheries coverage, the depth and size of the low flow channel and pools shall emulate the pre-construction conditions as closely as possible, within the finished channel topography. 2. All material used to construct temporary fills shall be removed upon completion of the project.
3.16	Restore Spawning Gravels in Work Site Areas	The District shall replace gravels at the end of construction in potential salmonid spawning reaches. 1. Spawning gravels removed as a result of stream maintenance activities shall be replaced using a gravel/cobble mixture representing the size and relative abundance of gravel/cobbles present pre-project impact. 2. Spawning gravel replacement will be configured to maximize functional benefits including salmonid spawning, aquatic invertebrate production, and juvenile escape cover.

BMP	Title	Description
3.17	Reuse Sediments and Gravels As Appropriate	Where practical, the District will reuse removed sediments and gravels. Sediments that are considered for re-use will be tested for hazardous materials and graded for structure as necessary in order to determine their appropriateness for re-use and consistency with BMPs 1.3 and 3.16. When sediments or gravels are reused, the District will ensure that the reuse does not cause any additional erosion, siltation, or other negative environmental consequences. Reuse will be considered within the context of environmental, regulatory, and fiscal consequences.
4.3	Stabilized Construction Entrance	The District shall implement measures to minimize soil from being tracked onto streets near work sites: 1. Methods used to prevent mud from being tracked out of work sites onto roadways include installing a layer of geotextile mat, followed by a 4-inch thick layer of 1-3- inch diameter gravel on unsurfaced access roads. 2. Access shall be provided as close to the work area as possible, using existing ramps where available and planning work site access so as to minimize disturbance to the creek bed, creek banks, and the surrounding land uses.
5.1	Bay Area Quality Management District Basic Dust Control Measures	The District shall implement Bay Area Quality Management District Basic Control Measures at maintenance sites less than four acres in size. Current measures stipulated by the Bay Area Quality Management District CEQA Guidelines include the following: 1. Active maintenance areas shall be watered at least twice per day unless soils are already sufficiently moist to avoid dust. 2. Trucks hauling sediments and other loose material shall be covered or shall maintain at least two feet of freeboard. 3. Tailgates of trucks shall be sealed. 4. Trucks shall be brushed down before leaving the maintenance site. 5. Unpaved access roads and staging areas that are being used for the maintenance activity shall be watered three times daily, or non-toxic soil stabilizers shall be applied to control dust generation. 6. Paved maintenance site access roads shall be swept when visible soil material is carried onto the roadway.

5.2	Bay Area Quality Management District Enhanced Dust Control Measures	For single maintenance sites greater than four acres, the District shall implement Bay Area Quality Management District Enhanced Dust Control Measures. These measures include the following: 1. Inactive areas shall be sprayed with soil stabilizer or seeded. 2. Exposed stockpiles shall be watered, enclosed, covered, or sprayed with soil stabilizers. 3. Traffic speeds shall be limited to 15 mph. 4. Sandbags or other bank protections shall be installed to prevent silt runoff to roadways. 5. Vegetation in disturbed areas shall be replanted as soon as horticulturally appropriate. For example, plant material may not be ready as soon as the job is done (e.g. willow cuttings have to be collected during winter dormancy).
5.3	Avoid Stockpiling Potentially Odorous Sediments	Some of the sediment removal sites will have sediment that is rich in organic matter decaying in an anaerobic conditions, which generates assorted malodorous gases, such as reduced sulfur compounds. These sediments shall be handled in a manner that avoids impacting sensitive receptors. 1. The District shall avoid stockpiling potentially odorous sediments within 1000 feet of residential areas or other odor sensitive land uses. 2. Where appropriate, odorous stockpiles shall be disposed of at an appropriate landfill.

VEGETATION MANAGEMENT

BMP	Title	Description
1.14	Minimize Sediment Transport Downstream from In-channel Herbicide Sites	Where sediment has accumulated due to vegetation in-channel, herbicide application may result in release of sediment downstream. Prior to herbicide application within active channels, the potential for significant sediment release shall be assessed. If the site has the potential for significant sediment release, then one of two techniques will be considered: 1. Where an area has not been routinely treated with herbicides, new herbicide applications shall be phased over several seasons, or 2. Remove the excess sediment through mechanical means after the vegetation is killed.
1.16	Minimize Local Erosion Increase from In-channel Vegetation Removal	In-channel vegetation removal may result in increased local erosion due to increased flow velocity. To minimize the effect, the toe of the bank shall be protected by leaving vegetation to the maximum extent possible consistent with the maintenance guidelines.
3.18	Herbicide Use in Aquatic Areas	Only herbicides and surfactants registered for aquatic use shall be applied within the banks of channels within 20 feet of any water present. Aquatic herbicide use shall be limited to July 1st through October 15th, except on Guadalupe River, where it is limited to July 1st to August 15th. If rain is forecast within 72 hours, then application of aquatic herbicide shall be rescheduled.

BMP	Title	Description
3.20	Minimize Adverse Effects of Herbicides on Non-target Species	Herbicides are a key component of vegetation management under the SMP. Herbicides shall be used in a manner that minimizes negative environmental effects by avoiding impacts to non-target species. Herbicide use shall be guided by label restrictions and any advisories published by the California Department of Pesticide Regulation (CDPR) or the County Agricultural Commission. The US EPA bulletin *Protecting Endangered Species, Interim Measures for Use of Pesticides in Santa Clara County* provides additional guidelines for herbicide use (US EPA 2000). 1. Herbicide use shall be reviewed annually prior to application using information from CDPR and US EPA maintained in the District GIS database to determine the potential presence of special-status species that could be adversely affected, and the target areas and chemicals used will be modified as necessary. 2. To avoid toxic effects to all life stages of California Red-legged Frogs (RLF), whenever herbicides are to be used in within 1.25 miles of known RLF locations, the District shall refer to both the product label for the material being used and the Endangered Species Database maintained by the California Department of Pesticide Regulation and use the lower of the two recommended rates if there is a difference.
3.22	Herbicide Use in Upland Areas	Application of herbicides to upland areas shall not be made within 72 hours of predicted rainfall.
4.7	Herbicide Use Requirements	All herbicide use shall be consistent with approved product specifications. Applications shall be made by, or under the direct supervision of, State Certified applicators under the direction of a licensed Pest Control Advisor.

BANK PROTECTION

BMP	Title	Description
1.3	Dewater/ Bypass Water at Non-tidal Sites	When work in a flowing stream in unavoidable, the entire streamflow shall be diverted around the work area by a barrier. Construction of the barrier shall normally begin in the upstream area and continue in an downstream direction, and the flow shall be diverted only when construction of the diversion is completed. The water diversion plan shall allow stream flows to gravity flow around or through the work site using temporary culverts or stream flow is pumped around the work site using pumps and screened intake hoses. Coffer dam construction shall be adequate to prevent seepage into or from the work area. Coffer dams shall be constructed of river run gravel with a fines content that is less than 15%. Fines are defined as material that is able to pass through a #20 sieve. Coffer dams may also be constructed of sheet piles, inflatable dams, and sand bags. Coffer dams shall be installed both upstream and downstream not more than 100 feet from the extent of the work areas. In-channel berms that only deflect water to one side of the channel during sediment removal, may be constructed of channel material. The enclosure and the supportive material shall be removed when the work is completed and the removal shall normally proceed from downstream in an upstream direction. Normal flows shall be restored to the affected stream immediately upon completion of work at that location. 1. All water shall be discharged in a non-erosive manner (e.g., gravel or vegetated bars, on hay bales, on plastic, on concrete, or in storm drains when equipped with filtering devices, etc.). 1. Sumps or basins may also be used to collect water, where appropriate (e.g., in channels with low flows). 2. Where feasible and appropriate, diversion structures shall be installed on concrete sections of the channels or constructed of materials specified above. Earth fill shall not be used for cofferdams in non-tidal areas. 3. In conjunction with diversion structures, pumps or gravity-fed pipe systems are used to de-water sites. 4. Depending on the channel configurations, sediment removal may occur where the flows are not bypassed around the work site; as long as during excavation activities, a berm of sediment is left between the work area and stream flows to minimize water quality impacts. 5. Diversions shall maintain ambient stream flows below the diversion, and waters discharged below the project site shall not be diminished or degraded by the diversion.

BMP	Title	Description
1.4	Avoid Erosion When Restoring Flows	All temporary diversion structures and the supportive material shall be removed when the work is completed, but no more than 48 hours after work is completed. The removal shall normally proceed from downstream in an upstream direction. Normal flows shall be restored to the affected stream immediately upon completion of work at that location. Flows shall be restored in a manner that minimizes erosion. 1. When diversion structures are removed, to the extent practicable, the ponded flows shall be directed into the low-flow channel within the work site to minimize downstream water quality impacts. 2. Flows shall gradually be restored to the channel to avoid a surge of water that would cause erosion or scouring. 3. Bypassed flows may be slowly reintroduced into the dewatered area by leaving a silt barrier in place to allow water to slow and drop sediment to the extent possible.
1.5	Erosion and Sediment Control Measures	Erosion control methods shall be used as appropriate during all phases of routine maintenance projects to control sediment and minimize water quality impacts. The District shall prevent erosion on steep slopes by using erosion control material according to manufacturer's specifications. All construction related erosion control methods shall be removed at the completion of the project. Appropriate measures include, but are not limited to, the following: 1. Silt Fences 2. Straw Bale Barriers 3. Brush or Rock Filters 4. Storm Drain Inlet Protection 5. Sediment Traps 6. Sediment Basins 7. Erosion Control Blankets and Mats 8. Soil Stabilization i.e. Tackified straw with seed, jute or geotextile blankets, etc. The following Bay Area Stormwater Management Agency Association BMPs provide guidance and specifications as to implementation of the erosion control measures described: SC-3. Sediment Basins SC-4. Straw or Sand Bag Barriers SC-5. Sediment Traps SC-6. Silt Fences SS-1. Erosion Control Blankets, Mats, and Geotextiles VR-1. Brush or Rock Filters VR-2. Check Dams VR-4b. Temporary Outlet Protection VR-4b. Storm Drain Inlet Protection WD-1. Earth Dike WD-1. Slope Drain WD-3. Temporary Drains and Swales

BMP	Title	Description
1.7	Pump/ Generator Set Operations and Maintenance	Pumps and generators shall be maintained and operated in a manner that minimizes impacts to water quality and aquatic species. 1. Pumps and generators shall be maintained according to manufacturers' specifications to regulate flows to prevent dryback or washout conditions. 2. Pumps shall be operated and monitored to prevent low water conditions, which could pump muddy bottom water, or high water conditions, which creates ponding. 3. Pump intakes shall be screened to prevent uptake of fish and other vertebrates.
1.10	Avoid Exposing Soils with High Mercury Levels	Bank Protection projects in portions of the Guadalupe River watershed affected by historical mercury mining may expose soils containing mercury which may affect stream water quality. 1. In the specified channel reaches in the Guadalupe River Basin, soils that are likely to be disturbed or excavated shall be tested for Mercury (Hg). Soils shall be remediated if: a. disturbed or excavated soils exposed to flood flows below the 2.33-year channel flow level exceed 1 ppm Hg, or b. disturbed or excavated soils above the 2.33-year flow level exceed 20 ppm Hg. 2. Remediation may be accomplished either by: a. treating the site so that contaminated soils excavated for the purpose of installing bank protection shall not be susceptible to erosion, or b. by further excavating contaminated soils and replacing them with clean fill or other bank protection materials that are free from contaminants. c. Soils with mercury concentrations exceeding 20 mg/kg shall be removed and disposed of in a Class I landfill following established work practices and hazard control measures. 3. To ensure worker safety is protected during bank protection projects with elevated mercury concentrations in the exposed surfaces, personal protective equipment will be required during project construction to maintain exposure below levels established by the Occupational Safety and health Agency (OSHA).

BMP	Title	Description
1.11	Concrete Use Near Waterways	Concrete that has not been cured is alkaline and can increase the pH of the water; fresh concrete shall be isolated until it no longer poses a threat to water quality using the following appropriate measures: 3. Wet sacked concrete shall be excluded from the wetted channel for a period of two weeks after installation. During that time, the wet sacked concrete shall be kept moist (such as covering with wet carpet) and runoff from the wet sacked concrete shall not be allowed to enter a live stream. 4. Poured concrete shall be excluded from the wetted channel for a period of two weeks after it is poured. During that time, the poured concrete shall be kept moist, and runoff from the wet concrete shall not be allowed to enter a live stream. Commercial sealants (e.g., Deep Seal, Elasto-Deck Reservoir Grade) may be applied to the poured concrete surface where difficulty in excluding water flow for a long period may occur. If a sealant is used, water shall be excluded from the site until the sealant is dry. 5. Dry sacked concrete shall not be used in any channel. 6. An area outside of the channel and floodplain shall be designated to clean out concrete transit vehicles.
1.12	Groundwater Management	If high levels of groundwater in a work area are encountered, the water is pumped out of the work site. If necessary to protect water quality, the water shall be directed into specifically constructed infiltration basins, into holding ponds, or onto areas with vegetation to remove sediment prior to the water re-entering a creek. Water pumped into vegetated areas shall be pumped in a manner that will not create erosion around vegetation.
1.15	Prevent Erosion Downstream of Bank Protection Sites	Increased water velocity at bank protection sites may increase erosion downstream. Bank stabilization site design shall assess hydraulic effects immediately upstream and downstream of the work area. If the hardscape revetment would cause significant increase in erosion potential, downstream energy dissipation features such as pools or grade control structures shall be considered in the design. If the evaluation identifies possible downstream impacts, proactive protection of these areas shall be provided. Such measures include, but are not limited to, appropriately keyed-in coir logs, riparian enhancement planting, strategic placement of rock, and flow deflectors.

BMP	Title	Description
2.2	Minimize Stream Access Impacts	District personnel shall use existing access ramps and roads where possible. If temporary access points are necessary, they shall be constructed in a manner that minimizes impacts to streams: 3. Temporary project access points shall be created as close to the work area as possible to minimize running equipment down stream channels and shall be constructed so as to minimize adverse impacts, such as tree removal. 4. When temporary access is removed, remaining disturbed soil shall be stabilized and seeded immediately after construction. 5. Any temporary fill used for access shall be removed upon completion of the project. Channel topography and geometry shall be restored to pre-project conditions to the extent possible.
2.3	Minimize Hardscape in Bank Protection Design	The District shall select bank repair techniques appropriate to a given site based on hydraulic and other site conditions. Refer to SMP Appendix E. Programmatic Impact Assessment and Mitigation for Routine Bank Protection Activities . 1. Biotechnical repair methods include live construction, willow wattling, erosion control blankets, brush matting, and installation of root wads and boulders in banks. 2. The repair shall be designed and installed so that it will be self-sustaining and use vegetation that adds structural integrity to the stream bank.

BMP	Title	Description
2.4	Success Criteria for Bank Protection Plantings	Monitoring shall be conducted annually for a minimum period of five (5) years or until success criteria for planting is met a minimum of two years after irrigation has been removed at the planting densities stated in the FEIR (See FEIR, Appendix E, page X-2)]. Revegetation will be judged successful and meeting full compliance if it meets these criteria: 1. 70% of the original number of plants installed are alive and healthy at the end of 5 years or 2. A site has 50% absolute cover of native vegetation within the 5-year period. If a site meets either of these requirements it will be judged as successful and monitoring will cease. 3. There will be no requirement for species diversity on bank protection projects. A variety of species replicating the natural plant community will be installed but ratios may adjust due to site conditions. A site will not be penalized due to a change in ratios or individual species dropping out. 4. Plants will be installed per the Protocol for Revegetation of Bank Protection Projects. Trees will have an average spacing of 10-12 feet and shrubs an average spacing of 6-8 feet. 5. New plantings may be installed at any time during the 5-year period. No approvals will be required for additional planting or design changes such as species selection, container size, etc. 6. Pole plantings done at the toe of the bank or in rock will be exempt from these criteria in regard to spacing and survival. Pole plantings will be installed wherever possible but, due to the highly variable success rate related to soil and water conditions, these plantings should not be evaluated in the same manner. The success of pole planting efforts will be included in annual reports but this particular planting element will not be factored into the quantitative success criteria. 7. A site that has extraordinary constraints may have a separate revegetation design submitted for approval at the time of the design review. Upon regulatory approval, the success criteria associated with individual designs shall supercede these general criteria.
2.5	Planting	Planting for erosion control and habitat restoration shall be in accordance with District revegetation guidelines with the following exception: a. Dri-Water shall not be used as a method of irrigation.

BMP	Title	Description
2.6	Mulching	Bark and other wood products shall be used as needed to prevent erosion of bare soil after construction is completed. 1. All newly planted and/or bare soil (excluding bare channel bottoms) in maintenance areas shall have a minimum 3" thick layer of bark or mulch installed except when the area is seeded. In that case, the thickness of the mulch layer shall not exceed ½ inch. 2. This bark or mulch can be ground-up woody products and/or leaves from either native material or from soil suppliers. 3. No non-native material that has allelopathic compounds (*Eucalyptus* spp.) or weed seeds shall be used as mulch in areas where it has the potential to inhibit native revegetation. Such areas would include flood plains and revegetation sites. 4. Any material imported from outside the District that is to be used as mulch shall be certified as weed-free.
2.8	Replace Trees	The District shall replace trees as follows: 1. Native trees that are lost to bank protection impacts shall be replaced at a 3:1 ratio and non-native trees that are lost shall be replaced at a 2:1 ratio. 2. Trees removed for installation of bank protection measures shall be replaced at the site, if feasible, or at the mitigation site created for that bank protection activity. 3. The Plant Selection Criteria, Planting Techniques, Maintenance, and Monitoring/Reporting protocols prescribed by the "Protocol for Revegetation Associated with Bank Protection" (Appendix E of SMP) shall be implemented, as applicable to tree replacement. 4. Replacement of heritage-sized trees (greater than 18 inches dbh) will be consistent with local ordinances.
2.9	Site Maintenance for Bank Protection Plantings	Follow-up maintenance shall be performed on sites that have been seeded and planted. 1. Maintenance shall include replacing dead or dying plants where appropriate, weeding, removing non-native plant colonizers, and ensuring that all plants receive sufficient water. 2. Irrigation shall be implemented as needed throughout the establishment period.

BMP	Title	Description
3.5	Minimize Loss of Aquatic Habitat from Bank Protection Work	Follow SMP Appendix E. Programmatic Impact Assessment and Mitigation for Routine Bank Protection Activities.
3.7	Salvage Native Aquatic Vertebrates from Dewatered Channels	If fisheries or native aquatic vertebrate are present when cofferdams, water bypass structures, and silt barriers are to be installed, a fish and native aquatic vertebrate relocation plan shall be implemented to ensure that fish and native aquatic vertebrates are not stranded: 1. In non-tidal channels, where water is to be diverted, prior to the start of work or during the installation of water diversion structures, native aquatic vertebrates shall be captured in the work area and transferred to another reach as determined by a qualified biologist (refer to Fish Relocation Guidelines) 2. Aquatic invertebrates will not be transferred (other than incidental catches) because of their anticipated abundance and colonization after completion of the repair work.
3.8	Minimize Effects of Bypass Structures on Steelhead	1. To prevent increases in temperature and decreases in dissolved oxygen (DO), if bypass pipes are used, they shall be properly sized (i.e., larger diameter pipes to better pass the flows). Bypass pipes may also be avoided by creating a low-flow channel or using other methods to isolate the work area. 2. In Non-tidal Areas, diversions on the Guadalupe River, Calero, Los Gatos, Guadalupe, Alamitos, Coyote, Upper Penitencia, Stevens, San Francisquito, Bodfish, Little Arthur, Uvas and Llagas Creeks shall maintain conditions required for fish passage. Diversions shall maintain fish passage when the project meets the following conditions: 1) the length of the area dewatered exceeds 500 feet, and/or 2) the length of time the stream is dewatered exceeds two weeks in length. Conditions for fish passage shall be met as long as the diversion 1) maintains contiguous flows through a low flow channel in the channel bed or an artificial open channel, 2) presents no vertical drops exceeding six (6) inches and follows the natural grade of the site, 3) maintains water velocities that shall not exceed eight feet per second (8 ft/sec), and 4) maintains adequate water depths consistent with normal conditions in the project reach. An artificial channel used for fish passage shall be lined with cobble/gravel. A closed conduit pipe shall not be used for fish passage. The inlets of diversions shall be checked daily to prevent accumulation of debris.

BMP	Title	Description
3.9	Retain Woody Materials and Vegetation	Woody material (including live leaning trees, dead trees, tree trunks, large limbs, and stumps) will be retained unless it is threatening a structure or impedes reasonable access. 1. Retain and flag stumps, snags, and branches in channels that can create fish habitat. 2. Ensure that this woody debris does not impede water flow and does not contribute to erosion. 3. When woody material is removed, priority will be given to reuse of the materials in bank protection projects. Non-native species containing allelopathic compounds shall not be used for construction of bank protection projects. Woody materials may also be used as mulch. (See BMP 2.6) 4. When retention will not compromise flood management system reliability, woody vegetation shall be left in place.
3.10	Conduct In-Channel Work During the Dry Season	Avoid and minimize impacts to salmonids by timing stream maintenance projects in streams where there are or could be salmonids so that the use of heavy equipment in the channel is conducted outside of the migration and spawning season. 1. Minor maintenance activities that occur above ordinary high water and do not impact the riparian corridor may be done at any time of the year. These activities include fence repair, graffiti removal, revegetation maintenance, rodent control, etc. 2. Minor activities will be done in channel if the activity is necessary to provide immediate flood protection. These activities include removal of trash or debris that will impede flows, trash rack cleaning, and pier nose cleaning. These activities will be done in a manner that is sensitive to protection of aquatic resources.
3.11	Avoid Dewatering an Entire Isolated Stream Reach	Construction sites may be isolated by upstream or downstream barriers, such as culverts. In reaches that contain deep pools, the District shall maintain these pools as refuges by constructing temporary fencing so as to avoid pool destruction when preservation of the pool is not in the construction footprint or a barrier to project access. This BMP does not apply to sediment removal activities that require the removal of all sediment to restore the design capacity.
3.12	Maintain Low-flow Fish Passage	If a nontidal stream channel has been altered during the operations, its low flow channel shall be returned as nearly as possible to its approximate prior location with appropriate depth for fish passage without creating a possible future bank erosion problem.
3.13	Remove Temporary Fills as Appropriate	Temporary fills, such as for access ramps, diversion structures, or cofferdams, shall be removed upon finishing the work.

BMP	Title	Description
3.14	Maintain or Provide Escape Cover	Stable undercut banks (generally those maintained by roots or boulders) shall remain in place. Larger boulders (≥2-foot diameter) with minimum 4-12" gaps used for rip-rap may provide cavities as escape cover that are not provided by sacked concrete, small rip-rap, or larger rip-rap with small rock in-fill.
3.15	Restore Pool Configuration of Channel Bottom	District shall re-grade the channel bottom at the end of the work project to The as close to original conditions as possible. 1. In areas used for migration by salmonids as designated on the District GIS Fisheries coverage, the depth and size of the low flow channel and pools shall emulate the pre-construction conditions as closely as possible, within the finished channel topography. 2. All material used to construct temporary fills shall be removed upon completion of the project.
3.16	Restore Spawning Gravels in Work Site Areas	The District shall replace gravels at the end of construction in potential salmonid spawning reaches. 1. Spawning gravels removed as a result of stream maintenance activities shall be replaced using a gravel/cobble mixture representing the size and relative abundance of gravel/cobbles present pre-project impact. 2. Spawning gravel replacement will be configured to maximize functional benefits including salmonid spawning, aquatic invertebrate production, and juvenile escape cover.

BMP	Title	Description
4.3	Stabilized Construction Entrance	The District shall implement measures to minimize soil from being tracked onto streets near work sites: 1. Methods used to prevent mud from being tracked out of work sites onto roadways include installing a layer of geotextile mat, followed by a 4-inch thick layer of 1-3- inch diameter gravel on unsurfaced access roads. 2. Access shall be provided as close to the work area as possible, using existing ramps where available and planning work site access so as to minimize disturbance to the creek bed, creek banks, and the surrounding land uses.
5.1	Bay Area Quality Management District Basic Dust Control Measures	The District shall implement Bay Area Quality Management District Basic Control Measures at maintenance sites less than four acres in size. Current measures stipulated by the Bay Area Quality Management District CEQA Guidelines include the following: 1. Active maintenance areas shall be watered at least twice per day unless soils are already sufficiently moist to avoid dust. 2. Trucks hauling sediments and other loose material shall be covered or shall maintain at least two feet of freeboard. 3. Tailgates of trucks shall be sealed. 4. Trucks shall be brushed down before leaving the maintenance site. 5. Unpaved access roads and staging areas that are being used for the maintenance activity shall be watered three times daily, or non-toxic soil stabilizers shall be applied to control dust generation. 6. Paved maintenance site access roads shall be swept when visible soil material is carried onto the roadway
5.2	Bay Area Quality Management District Enhanced Dust Control Measures	For single maintenance sites greater than four acres, the District shall implement Bay Area Quality Management District Enhanced Dust Control Measures. These measures include the following: 1. Inactive areas shall be sprayed with soil stabilizer or seeded. 2. Exposed stockpiles shall be watered, enclosed, covered, or sprayed with soil stabilizers. 3. Traffic speeds shall be limited to 15 mph. 4. Sandbags or other bank protections shall be installed to prevent silt runoff to roadways. 5. Vegetation in disturbed areas shall be replanted as soon as horticulturally appropriate. For example, plant material may not be ready as soon as the job is done (e.g. willow cuttings have to be collected during winter dormancy).

MINOR MAINTENANCE

BMP	Title	Description
1.1	Conduct Work During Low Flow Periods	For minor work activities that will occur in the channel, work shall be conducted from the top of the bank if access is available and there are flows in the channel.
1.7	Pump/ Generator Set Operations and Maintenance	Pumps and generators shall be maintained and operated in a manner that minimizes impacts to water quality and aquatic species. 1. Pumps and generators shall be maintained according to manufacturers' specifications to regulate flows to prevent dryback or washout conditions. 2. Pumps shall be operated and monitored to prevent low water conditions, which could pump muddy bottom water, or high water conditions, which creates ponding. 3. Pump intakes shall be screened to prevent uptake of fish and other vertebrates.
3.9	Retain Woody Materials and Vegetation	Woody material (including live leaning trees, dead trees, tree trunks, large limbs, and stumps) will be retained unless it is threatening a structure or impedes reasonable access. 1. Retain and flag stumps, snags, and branches in channels that can create fish habitat. 2. Ensure that this woody debris does not impede water flow and does not contribute to erosion. 3. When woody material is removed, priority will be given to reuse of the materials in bank protection projects. Non-native species containing allelopathic compounds shall not be used for construction of bank protection projects. Woody materials may also be used as mulch. (See BMP 2.6) 4. When retention will not compromise flood management system reliability, woody vegetation shall be left in place.

BMP	Title	Description
3.21	Minimize Rodenticide Impacts on Non-target Species	Burrowing rodents are controlled to minimize damage to levees on streams and canals. Rodent control areas shall be reviewed for the potential presence of special-status species and the rodent control methods tailored to minimize non-target species impacts. When chemical control is necessary, the use shall be guided by label restrictions and any advisories published by the California Department of Pesticide Regulation (CDPR) or the County Agricultural Commission. The EPA bulletin *Protecting Endangered Species, Interim Measures for Use of Pesticides in Santa Clara County* provides additional guidelines for rodenticide use (USEPA 2000). 1. Within the potential range of salt marsh harvest mouse (SMHM) (as designated on the District's GIS), lethal rodent control methods shall not be used. The District defines potential SMHM habitat as all areas north of Highway 237 as shown in Figure IV B11, and will refine this definition as surveys are conducted to eliminate areas that are separated by barren ground by at least 30 yards from any halophytic vegetation. 2. Prior to rodent control measures being employed, a qualified biologist shall conduct protocol surveys to determine the presence of Burrowing Owls. a. The location of Burrowing Owls shall be identified on the District's GIS system. b. A ½ mile buffer zone around burrowing owl locations shall be established. c. If necessary alternative methods of rodent control shall be determined by a qualified biologist. 3. The rodenticide applicator shall remove carcasses of poisoned animals, when they are found, to minimize secondary toxic effects on Raptors or other wildlife. Carcass survey and disposal shall be performed in the treated area beginning on the third day following the initial exposure of toxic baits. Any exposed carcasses shall be disposed of in a manner inaccessible to wildlife. Carcass surveys shall continue for at least 5 days after toxic baiting has ceased and thereafter, at least once a week, until no more carcasses are found. Any dead Raptors or other wildlife found in the treated area during the carcass surveys shall be turned over to CDFG's pesticide lab for analysis

APPENDIX D:

SAN FRANCISCO BAY AREA REGION

SEDIMENT CHARACTERIZATION SAMPLING PLAN

SANTA CLARA VALLEY WATER DISTRICT

SEDIMENT CHARACTERIZATION PLAN (FINAL)
FOR THE
SAN FRANCISCO BAY REGION
MULTI-YEAR STREAM MAINTENANCE PROGRAM

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DECEMBER 2001

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INTRODUCTION

The Santa Clara Valley Water District (District) proposes to conduct sediment removal activities (dredging) on thirty-six (36) creeks over the next ten (10) years. The purpose of the program is to alleviate local flooding problems and to meet the requirements of the Federal Emergency Management Agency for flood protection. Under the Multi-Year Stream Maintenance Program, an approximate average of 73,070 cubic yards (cy) of sediment will be removed annually. In order to effectively manage the removal and disposal of the sediments, it is necessary to characterize the physical and chemical properties of the sediments. This characterization allows the District to (1) effectively plan for disposal of the sediments, (2) assist with determining the best management practices (BMP) to implement, and (3) efficiently monitor the water quality impacts from the sediment removal operation.

Under the Multi-Year Program, sediment will be tested using the San Francisco Bay Regional Water Quality Control Board's (Regional Board) Wetland Screening Criteria to facilitate any beneficial reuse of sediment generated by the District at its proposed wetlands site. The physical and chemical properties of sediments tested by the District include metals, pesticides and organophosphorous compounds, polychlorinated biphenyls, polynuclear aromatic hydrocarbons, moisture content, grain size, attenberg limits, total organic carbon, asbestos, chloride, pH, total sulfides, ammonia, and toxicity. The applicable water quality objectives included in the San Francisco Bay Region Basin Plan (the Basin Plan) for surface waters are: pH, salinity, sulfide, dissolved oxygen, turbidity, toxicity, ammonia, metals, temperature, taste and odor, suspended/settleable/floating material, oil and grease, sediment, population and community ecology, bioaccumulation, and bacteria.

According to the Basin Plan, the Regional Board establishes and enforces Waste Discharge Requirements (WDR) for point and nonpoint source of pollutants at levels necessary to meet numerical and narrative water quality objectives. The sediment tests performed by the District each year, as part of its stream maintenance program, were developed since 1997, based on the historic occurrence of pollutants within Santa Clara Valley streams, in accordance with the Basin Plan water quality objectives, and the Regional Board's WDR through a stakeholder process. The stakeholder process and lessons learned meetings involved participation of the Regional Board, the California State Department of Fish and Game (DFG), the U.S. Environmental Protection Agency (EPA), the U.S. Army Corps of Engineers (Corps), and various environmental organizations which assisted the District in continuous evaluation and improvement of the sediment characterization plan since 1997.

The sediment characterization plan proposed for the District's Multi-Year Stream Maintenance Program, as presented herein, is a result of the District's sediment testing and evaluation effort, and continuous improvement process based on guidance from regulatory agencies and other stakeholders, since 1997.

In addition to characterizing the sediments based on statistical characterization method, the Sediment Characterization Plan incorporates a biased approach to characterize the areas with the highest potential to have pollutants. This biased sampling involves continuous core sediment sampling at selected locations, such as storm water outfalls and runoffs, and sediment deposition areas where there is a potential to detect pollutants. The goal of "continuous core" sampling is to determine the "worst case" characterization of the sediment (i.e., to most likely detect maximum number of contaminants at highest concentrations). This information will assist in determining the suitability for disposal of sediment, the type of BMPs to be implemented during sediment removal operations, and provides a basis for the self-monitoring program constituents.

SCOPE OF SEDIMENT PLAN

This sampling plan documents sampling and analytical procedures which will be utilized for the creek sites under the Multi-Year Sediment Removal Program. It is not intended to be a full characterization of all the stream sediments. The Sediment Characterization Plan is primarily designed to characterize sediment designated for removal (using continuous core and discrete sediment sampling methods). Discrete samples from residual sediment or exposed channel bottom in earthen channels only will be collected in an attempt to characterize the sediment that may be subject to erosion and transport during flows. This plan does not cover water quality sampling during sediment removal operations which will be covered under a separate plan.

The Sediment Characterization Plan addresses the following sampling methods designed to meet the overall objectives of landfill acceptance, sediment reuse at alternative sites, water quality protection, and fish and wildlife protection:

1. Continuous core sediment sampling
2. Discrete sediment sampling
3. Residual sediment sampling

OBJECTIVES

The specific objectives of the Sediment Characterization Plan are as follows:

1. Characterize the sediments for acceptance by landfills for disposal or reuse.
2. Characterize the sediments to determine their suitability for reuse at alternative disposal sites (i.e., nonlandfill reuse sites).
3. Compliance with regulatory requirements for the Sediment Removal Program, as prescribed in the following documents:
    - Regional Board WDR's for the District's Multi-Year Sediment Removal Program aimed primarily at water quality protection.
    - The District and DFG Memorandum of Understanding for Routine Maintenance Activities in Improved Channels aimed primarily at protection of fish and wildlife.
4. Provide data for evaluation of the feasibility of long-term disposal, reuse, and recycling opportunities for sediment generated by the District.
5. Provide a basis for the Self-Monitoring Program to determine whether additional water quality constituents should be monitored.

BACKGROUND

SEDIMENT REMOVAL PROGRAM

The District proposes to conduct sediment removal activities (dredging) at creek sites. Table 1 outlines the names of creeks by District zones, locations, and approximate amounts of sediment removal proposed over the next ten (10) years.

PURPOSE OF SEDIMENT CHARACTERIZATION

There are four main reasons for characterizing the sediments described as follows:

Landfill Acceptance

Landfills require materials to be characterized before they accept the same for disposal or reuse at their site. They generally require representative sediment samples analyzed by requiring a select number of discrete samples from a stockpile composited into a single sample for analyses. The approach of sampling a stockpile is difficult, if not impossible, during the District's sediment removal operations. The District has limited project access and area to stockpile material while analytical results are pending. In order to be able to characterize the material, the District must conduct in-situ sampling and composite the samples for analyses. This approach has been acceptable to the landfills under previous Sediment Removal Projects.

Alternative Reuse Sites

Alternative reuse sites generally consist of contractors using materials for construction. These alternatives are typically time dependant on the contractor's construction schedule. The contractors have been requesting characterization of the materials. The characterization method of constituents varies between contractors, but in general, has been less stringent than the landfills.

The San Francisco Bay Regional Water Quality Control Board

The Regional Board has required characterization of the materials to determine if the proposed disposal method is acceptable. The Regional Board must ensure that the disposal of the material will not pose a threat to the waters of the state. The Regional Board is interested in determination of total mercury and polychlorinated biphenyls (PCB's) in residual sediment after sediment removal.

The California Department of Fish and Game

The DFG requests that the materials be characterized to determine if they will adversely impact fish and wildlife. The removal operations may cause sediments to be resuspended and migrate downstream where it may have an impact on fish and wildlife. The DFG is interested in the toxicity of the sediments to fish and wildlife.

Table 1
San Francisco Bay Area Region
Multi-Year Sediment Removal Sites

Creek	Location4	Crk No	Type	Freq (No. of times work to be done in 10 years)	From Sta	To Sta	Length (ft)	Estimated Total Length for 10 year Program (ft)	Avg Vol each time removed (cy)	Estimated Total Vol for 10 year Program (cy)	Ave. Vol./Yr. (cy)
Lower Peninsula Watershed (North West Zone)											
Adobe Creek	Hwy 101 to Lewis	1010	C	4	130+00	170+00	4,000	16,000	4,500	18,000	1,800
	Near El Camino		C	4	220+00	250+00	3,000	12,000	1,700	6,800	680
Baron Creek Debris Basin	Foothill to Miranda	1012	DB	1	159+00	162+00	300	300	5,000	5,000	500
Matadero Creek	Hwy 101 to Rosa	1021	EB,C	6	94+00	140+00	4,600	27,600	2,600	15,600	1,560
Permanente Diversion	Near Grant	1023	C	4	50+00	65+00	1,500	6,000	500	2,000	200
Permanente Creek	Hwy 101 to Charleston	1024	E	4	113+00	126+00	1,300	5,200	1,000	4,000	400
	d/s Portland		C	3	340+00	350+00	1,000	3,000	1,000	3,000	300
San Francisquito Creek	d/s Hwy 101	1029	E	3	70+00	80+00	1,000	3,000	4,500	13,500	1,350
Stevens Creek	Crit. To L'Avenida	1029	E	5	88+00	130+00	4,200	21,000	12,000	60,000	6,000
	near Moffet		C	5	150+00	165+00	1,500	7,500	2,000	10,000	1,000
West Valley Watershed (North Central Zone)											
Calabazas Creek	d/s Hwy 101	2010	E	3	82+00	102+00	2,000	6,000	3,000	9,000	900
	near Pomeroy		C	4	250+00	252+00	200	800	200	800	80
	near Georgetown		C	4	194+00	196+00	200	800	200	800	80
	Comer Debris Basin		DB	3	599+00	605+00	600	1,800	800	2,400	240
Junipero Serra Channel	to Blaney	2013	E	1	0000	60+00	6,000	6,000	1,000	1,000	100
Regnart Creek	near Kim	2017	E	5	80+00	85+00	500	2,500	200	1,000	100
Rodeo Creek	Dandridge	2018	C	3	3+00	4+50	150	450	500	1,500	150
	Rainbow		C	3	12+00	13+00	100	300	50	150	15
	Dartmore		C	3	27+00	28+00	100	300	50	150	15
San Tomas Aquino Creek	d/s Monroe	2019	E,C	3	0000	225+00	22,500	67,500	30,000	90,000	9,000

C: Concrete
E: Earth
CB: Concrete Bottoms
EC: Excavated Channel
DB: Debris Basin
LF: Low Flow

Table 1
San Francisco Bay Area Region
Multi-Year Sediment Removal Sites
(Continued)

Creek	Location4	Crk No	Type	Freq (No. of times work to be done in 10 years)	From Sta	To Sta	Length (ft)	Estimated Total Length for 10 year Program (ft)	Avg Vol each time removed (cy)	Estimated Total Vol for 10 year Program (cy)	Ave. Vol./Yr. (cy)
	Westmont Debris Basin		DB	3	637+00	642+00	500	1,500	5,500	16,500	1,650
Saratoga Creek	to Warburton	2021	E	5	0000	34+00	3,400	17,000	6,000	30,000	3,000
	near Lawrence, Hwy 280		E	1	170+00	200+00	3,000	3,000	5,000	5,000	500
	Prospect		C	1	304+00	306+00	200	200	500	500	50
Smith Creek	to Elam	2023	C,E	1	0000	17+00	1,700	1,700	200	200	20
Sunnyvale East Channel	to Hwy 101	2026	E	4	0000	110+00	11,000	44,000	8,000	32,000	3,200
Sunnyvale West Channel	Carl to Hwy 101	2027	E	2	50+00	134+00	8,400	16,800	4,500	9,000	900
El Camino Storm Drain	to Monroe	2037	C	1	0000	52+00	5,200	5,200	1,200	1,200	120
Guadalupe Watershed (Central Zone)											
Canoas Creek	All	3011	CB	4	0000	390+00	39,000	156,000	12,000	48,000	4,800
Greystone Creek	to Almaden	3014	E	1	0000	21+00	2,100	2,100	5,000	5,000	500
Guadalupe River	d/s Montague	3015	EC	6	315+00	390+00	7,500	45,000	10,000	60,000	6,000
	d/s Trimble		E	3	390+00	450+00	6,000	18,000	8,000	24,000	2,400
	St. John St.		C	4	663+00	670+00	700	2,800	2,500	10,000	1,000
Ross Creek	Cherry	3023	C	5	27+00	28+50	150	750	200	1,000	100
	Jarvis		C	5	43+00	44+00	100	500	200	1,000	100
	u/s Jarvis		C	5	47+00	50+00	300	1,500	200	1,000	100
	Meridian		C	5	71+00	72+00	100	500	200	1,000	100
	d/s Leigh		C	5	151+00	153+00	200	1,000	200	1,000	100
	d/s Union		C	5	178+00	181+00	300	1,500	200	1,000	100
	Los Gatos Almaden		C	5	204+00	205+00	100	500	200	1,000	100
	Almaden Valley Pipeline		C	5	222+00	223+25	125	625	200	1,000	100

C: Concrete
E: Earth
CB: Concrete Bottom
EC: Excavated Channel
DB: Debris Basin
LF: Low Flow

Table 1
San Francisco Bay Area Region
Multi-Year Sediment Removal Sites
(Continued)

Creek	Location4	Crk No	Type	Freq (No. of times work to be done in 10 years)	From Sta	To Sta	Length (ft)	Estimated Total Length for 10 year Program (ft)	Avg Vol each time removed (cy)	Estimated Total Vol for 10 year Program (cy)	Ave. Vol./Yr. (cy)
Guadalupe Creek	at Camden Road	3026	E	3	1165+00	1170+00	500	1,500	500	1,500	150
Randol Creek	Rajkovitch to u/s Viewpoint	3029	E	1	45+00	80+00	3,500	3,500	3,000	3,000	300
Coyote Watershed (East Zone)											
Berryessa Creek	to Los Coches Creek	4017	E	5	0000	93+50	9,350	46,750	15,000	75,000	7,500
	Los Coches to Montague		E	3	93+50	165+00	7,150	21,450	3,500	10,500	1,050
	Cropley to Morrill		E	3	230+00	234+00	400	1,200	1,500	4,500	450
	d/s Piedmont		E	3	284+00	298+00	1,400	4,200	2,500	7,500	750
Calera Creek	to Drop Structure	4018	E	4	0000	31+00	3,100	12,400	1,500	6,000	600
	to Russell Lane		E	2	31+00	48+00	1,700	3,400	1,500	3,000	300
Fisher Creek	Leguna	4023	E	1	145+00	155+00	1,000	1,000	1,000	1,000	100
Los Coches Creek	to u/s Hwy 680	4025	E	3	0000	24+00	2,400	7,200	1,000	3,000	300
Lower Silver Creek	d/s McKee	4026	E	5	38+00	52+00	1,400	7,000	1,500	7,500	750
	u/s Alum Rock		C	3	88+00	100+00	1,200	3,600	600	1,800	180
	Jackson to Capital		E	1	128+00	155+00	2,700	2,700	1,500	1,500	150
	u/s No. Babb		E	1	168+00	173+00	500	500	500	500	50
	d/s Martha Street		E	3	200+00	205+00	500	1,500	500	1,500	150
	Cunningham to Quimby		E	3	245+00	315+00	7,000	21,000	10,000	30,000	3,000
	King to Pipe		E	2	367+00	377+50	1,050	2,100	1,000	2,000	200
Miguelita Creek	Lochridge to Educational Park Drive	4029	E	3	10+00	25+00	1,500	4,500	1,000	3,000	300
	d/s Jackson to Jackson		E	3	37+00	44+00	700	2,100	500	1,500	150
Upper Penitencia Crk	King	4032	E	2	35+00	38+00	300	600	300	600	60
	Maybury		E	2	55+00	57+00	200	400	200	400	40
	near Maybury		E	2	71+00	72+00	100	200	100	200	20
Lower Penitencia Crk	to CA Circle	4033	E,C	8	0000	50+00	5,000	40,000	5,000	40,000	4,000

C: Concrete
E: Earth

CB: Concrete Bottom
EC: Excavated Channel

DB: Debris Basin
LF: Low Flow

Table 1
San Francisco Bay Area Region
Multi-Year Sediment Removal Sites
(Continued)

Creek	Location4	Crk No	Type	Freq (No. of times work to be done in 10 years)	From Sta	To Sta	Length (ft)	Estimated Total Length for 10 year Program (ft)	Avg Vol each time removed (cy)	Estimated Total Vol for 10 year Program (cy)	Ave. Vol./Yr. (cy)
	Calavaras to d/s Hetch Hetchy		E,C	4	112+00	140+00	2,800	11,200	2,500	10,000	1,000
Sierra Creek	Berryessa to Mauna Kea	4037	E	3	0000	72+00	7,200	21,600	2,500	7,500	750
Upper Silver Creek	to Hwy 101	4038	C	2	0000	35+00	3,500	7,000	1,000	2,000	200
Tularcitos Creek	to Hwy 680	4040	E	2	0000	38+00	3,800	7,600	3,500	7,000	700
Norwood Creek	to White Road	4042	E	2	0000	32+00	3,200	6,400	1,800	3,600	360
Thompson Creek	u/s Quimby	4047	E	1	0000	20+00	2,000	2,000	1,000	1,000	100
TOTAL							219,975	752,825			73,070

C: Concrete	CB: Concrete Bottom	DB: Debris Basin
E: Earth	EC: Excavated Channel	LF: Low Flow

SAMPLING METHODS

This section describes the frequency of sampling and the location of sample collection at the Sediment Removal Program sites for both the sediment designated for removal and the residual sediment. From both the regulatory and scientific perspectives, the primary objectives of a sampling plan for a solid material are twofold: namely, (1) to collect samples that are representative samples as exhibiting average properties of the whole solid material and (2) to collect samples that will allow measurements of the chemical properties of the waste that are both accurate and precise.

SAMPLING OF SEDIMENT DESIGNATED FOR REMOVAL

Continuous core and discrete sediment samples will be collected for characterization of sediment designated for removal.

Sampling of Continuous Core Sediment Samples

The District plans to collect continuous core sediment samples at selected locations (e.g., at outfalls, sediment deposition areas). The purpose of continuous core sediment sampling will be to establish a basis for the water quality sampling and monitoring effort during dredging operations. Each continuous core sample will be composited for analyses.

Continuous Core Sample Collection Frequency

The number of continuous core sampling locations for all creeks is one sample per 4,000 cy of sediment to be removed. All continuous core samples will be analyzed for total metals (EPA 6010 and 7000 series), pesticides (EPA 8081), PAH (EPA 8310), and toxicity screening (tidal sites only) (Corps' method for Eohaustorius Estaurius). Only one continuous core sample that best meets specified sampling criteria at each creek site will be analyzed using all tests listed in Table 4 to maintain consistency with past data. If multiple samples are collected, other samples at the creek site will be tested for the four analytes identified as above (metals, pesticides, PAH, and toxicity). Table 2A presents the following information: the sediment removal sites, the approximate location of the sites, the length of work area by stations of the upstream and downstream limits of the sites, the type of site (tidal/nontidal, lining type), the estimated average annual volume of sediment generated at each site, and the average number of sampling locations at each site.

Continuous Core Sample Locations

The continuous core sampling locations are locations that have the potential for detecting maximum number of contaminants, at highest concentrations within the creek. Such sampling locations shall be determined based on criteria such as known locations of outfalls, storm water runoff locations, and by visually identifying potential sediment deposition areas and industrial sources along the stream stretches where dredging is planned. In this regard, the District will identify the continuous core sampling locations that best meet these criteria, possibly with the DFG and/or Regional Board during a field visit. At each creek site, a minimum of one continuous core sediment sample will be collected at location that best meets the above specified criteria.

Sampling of Discrete Sediment Samples

The proposed sampling approach is consistent with the EPA protocol described under SW-846, "Test Methods for Evaluating Solid Waste."

Reliable information concerning the chemical properties of a solid waste is needed for the purpose of comparing chemical properties with applicable regulatory thresholds. For chemical information to be reliable, it must be accurate and precise. Accuracy is usually achieved by incorporating some form of randomness into the selection process for the samples that generate the data. Precision is most often obtained by selecting an appropriate number of samples.

For the Sediment Sampling Program, the District proposes to utilize a systematic random sampling technique, in which the first unit to be collected from a population is randomly selected, but all subsequent units are taken at fixed space intervals. For example, if a sample has to be collected every 1,000 feet from a stream 10,000-foot long, only the first sample will be collected at a random location (0 to 1,000 feet). The second sample will be spaced 1,000 feet from the first one and so on until all ten samples are collected. The advantages of systematic random sampling over other sampling techniques are the ease with which samples are identified, and collected, an increase in precision, and to collect representative data on chemical properties.

Discrete Sample Collection Frequency

In order to characterize the sediment, one composite in-situ sample shall be collected and analyzed approximately every 4,000 cy. Approximately one sample shall be collected every 1,000 cy. These samples will be composited together by the laboratory. Up to four (4) samples shall be composited together, and analysis shall be performed on the composite samples. For example, if 30,000 cy of sediment is to be removed along a single creek, 30 samples shall be collected and composited in the laboratory into eight (8) samples (seven 4-point composite samples and one 2-point composite sample). Analysis shall then be performed on the eight (8) composite samples. Each sample shall be analyzed for multiple constituents (see Analytical Procedures).

Table 2B presents the following information: the sediment removal sites, the approximate location of the sites, the length of work area by stations of the upstream and downstream limits of the sites, the type of site (tidal/nontidal, lining type), the average annual estimated volume of sediment generated at each site, and the average number of sampling locations at each site.

Discrete Sample Locations

The location of each sample at the Sediment Removal Program sites must be selected in the following three dimensions: (1) the creek station, or the location along the length of the creek; (2) the location along the creek cross section; and (3) the depth below ground surface (bgs). The rationale for selection of a sampling location in all three dimensions is described below:

Location Along the Creek Length (Station)

Samples shall be collected at regular intervals along the length of the creek. The sampling interval shall be determined by dividing the length of the creek reach by the number of samples to be collected. For example, if it is desired to collect five samples along a 1.8-mile reach of a creek, divide the creek length (1.8 miles), by the number of samples (five) to be collected (1.8 miles/5=0.36 mile). Therefore, one sample shall be collected about every 0.36 mile or approximately one sample every 1,900 feet.

The initial sampling location along a creek reach shall be selected by generating a random number (X) within the sampling interval, and the initial sample shall be collected X feet upstream (or downstream) of the upstream (or downstream) end of the reach. For example, if the sampling interval is to be 1,900 feet, a random number shall be generated between 0 and 1,900. The first sampling location shall be approximately X feet from either the upstream or downstream end of the reach. Subsequent samples shall be located at approximately X+1,900 feet; X+2(1,900) feet; etc., from the start or end of the creek reach.

Sampling intervals may be determined by estimating distances on a map.

In the event that there is no sediment in the creek at the designated sampling interval, sampling staff shall proceed either upstream or downstream until a sediment deposition is found in the creek, and the sample shall be collected at that location.

Location Along the Creek Cross Section

The sampling location along the cross section shall be chosen by dividing the creek invert into thirds. A random number generator table (Appendix A) shall be used to generate a number between one and three at each cross section. If the random number selected is one, the sample will be collected from the left third (looking upstream) of the cross section; if the random number selected is two, the sample will be collected from the center third; and if the random number selected is three, the sample will be collected from the right third (looking upstream).

For example, if the width of section of creek where sediment is to be removed from is 12 feet across, the creek section shall be divided into three 4-foot-wide sections. Using Appendix A, the random number of three is selected, and the sample will be collected from the right 4-foot section of the creek.

A sample exercise for selecting sample locations is presented under Appendix B.

Table 2A
San Francisco Bay Area Region
Multi-Year Sediment Removal Sites
Sampling Locations and Frequency
(Average Annual Continuous Core Sediment Sampling)

Creek	Location	Length of Work Area		Type of Site	Tidal / Non- Tidal	Estimated Annual Sediment Volume (cy)	Average Number of Samples
		Beg. Sta. (ft)	End Sta. (ft)				
Lower Peninsula Watershed (NorthWest Zone)							
Adobe Creek	Hwy 101 to Lewis	130+00	170+00	C	Non-Tidal	1,800	2
	Near El Camino	220+00	250+00	C	Non-Tidal	680	1
Baron Creek Debris Basin	Foothill to Miranda	159+00	162+00	E	Non-Tidal	500	2
Matadero Creek	Hwy 101 to Rosa	94+00	140+00	EB,C	Non-Tidal	1,560	1
Permanente Diversion	Near Grant	50+00	65+00	C	Non-Tidal	200	1
Permanente Creek	Hwy 101 to Charleston	113+00	126+00	E	Non-Tidal	400	1
	d/s Portland	340+00	350+00	C	Non-Tidal	300	1
San Francisquito Creek	d/s Hwy 101	70+00	80+00	E	Tidal	1,350	2
Stevens Creek	Crit. To L'Avenida	88+00	130+00	E	Tidal/Non-Tidal	6,000	3
	near Moffet	150+00	165+00	C	Non-Tidal	1,000	1
West Valley Watershed (North Central Zone)							
Calabazas Creek	d/s Hwy 101	82+00	102+00	E	Non-Tidal	900	1
	near Pomeroy	250+00	252+00	C	Non-Tidal	80	1
	near Georgetown	194+00	196+00	C	Non-Tidal	80	1
	Comer Debris Basin	599+00	605+00	E	Non-Tidal	240	1
Junipero Serra Channel	to Blaney	0000	60+00	E	Non-Tidal	100	1
Regnart Creek	near Kim	80+00	85+00	E	Non-Tidal	100	1
Rodeo Creek	Dandridge	3+00	4+50	C	Non-Tidal	150	1
	Rainbow	12+00	13+00	C	Non-Tidal	15	1
	Dartmore	27+00	28+00	C	Non-Tidal	15	1
San Tomas Aquino Creek	d/s Monroe	0000	225+00	E,C	Tidal/Non-Tidal	9,000	8
	Westmont Debris Basin	637+00	642+00	E	Non-Tidal	1,650	2

C: Concrete
E: Earth
CB: Concrete Bottom
EC: Excavated Channel
DB: Debris Basin
LF: Low Flow

Table 2A
San Francisco Bay Area Region
Multi-Year Sediment Removal Sites
Sampling Locations and Frequency
(Average Annual Continuous Core Sediment Sampling)

(Continued)

Creek	Location	Length of Work Area		Type of Site	Tidal / Non- Tidal	Estimated Annual Sediment Volume (cy)	Average Number of Samples
		Beg. Sta. (ft)	End Sta. (ft)				
Saratoga Creek	to Warburton	0000	34+00	E	Non-Tidal	3,000	2
	near Lawrence, Hwy 280	170+00	200+00	E	Non-Tidal	500	2
	Prospect	304+00	306+00	C	Non-Tidal	50	1
Smith Creek	to Elam	0000	17+00	C,E	Non-Tidal	20	1
Sunnyvale East Channel	to Hwy 101	0000	110+00	E	Tidal/Non-Tidal	3,200	2
Sunnyvale West Channel	Carl to Hwy 101	50+00	134+00	E	Tidal/Non-Tidal	900	2
El Camino Storm Drain	to Monroe	0000	52+00	C	Non-Tidal	120	1
Guadalupe Watershed (Central Zone)							
Canoas Creek	All	0000	390+00	CB	Non-Tidal	4,800	3
Greystone Creek	to Almaden	0000	21+00	E	Non-Tidal	500	2
Guadalupe River	d/s Montague	315+00	390+00	EC	Tidal	6,000	3
	d/s Trimble	390+00	450+00	E	Non-Tidal	2,400	2
	St. John St.	663+00	670+00	C	Non-Tidal	1,000	1
Ross Creek	Cherry	27+00	28+50	C	Non-Tidal	100	1
	Jarvis	43+00	44+00	C	Non-Tidal	100	1
	u/s Jarvis	47+00	50+00	C	Non-Tidal	100	1
	Meridian	71+00	72+00	C	Non-Tidal	100	1
	d/s Leigh	151+00	153+00	C	Non-Tidal	100	1
	d/s Union	178+00	181+00	C	Non-Tidal	100	1
	Los Gatos Almaden	204+00	205+00	C	Non-Tidal	100	1
	Almaden Valley Pipeline	222+00	223+25	C	Non-Tidal	100	1

C: Concrete
E: Earth
CB: Concrete Bottom
EC: Excavated Channel
DB: Debris Basin
LF: Low Flow

Table 2A
San Francisco Bay Area Region
Multi-Year Sediment Removal Sites
Sampling Locations and Frequency
(Average Annual Continuous Core Sediment Sampling)
(Continued)

Creek	Location	Length of Work Area		Type of Site	Tidal / Non- Tidal	Estimated Annual Sediment Volume (cy)	Average Number of Samples
		Beg. Sta. (ft)	End Sta. (ft)				
Guadalupe Creek	at Camden Road	1165+00	1170+00	E	Non-Tidal	150	1
Randol Creek	Rajkovitch to u/s Viewpoint	45+00	80+00	E	Non-Tidal	300	1
Coyote Watershed (East Zone)							
Berryessa Creek	to Los Coches Creek	0000	93+50	E	Tidal	7,500	4
	Los Coches to Montague	93+50	165+00	E	Non-Tidal	1,050	1
	Cropley to Morrill	230+00	234+00	E	Non-Tidal	450	1
	d/s Piedmont	284+00	298+00	E	Non-Tidal	750	1
Calera Creek	to Drop Structure	0000	31+00	E	Non-Tidal	600	1
	to Russell Lane	31+00	48+00	E	Non-Tidal	300	1
Fisher Creek	Leguna	145+00	155+00	E	Non-Tidal	100	1
Los Coches Creek	to u/s Hwy 680	0000	24+00	E	Non-Tidal	300	1
Lower Silver Creek	d/s McKee	38+00	52+00	E	Non-Tidal	750	1
	u/s Alum Rock	88+00	100+00	C	Non-Tidal	180	1
	Jackson to Capital	128+00	155+00	E	Non-Tidal	150	1
	u/s No. Babb	168+00	173+00	E	Non-Tidal	50	1
	d/s Martha Street	200+00	205+00	E	Non-Tidal	150	1
	Cunningham to Quimby	245+00	315+00	E	Non-Tidal	3,000	3
	King to Pipe	367+00	377+50	E	Non-Tidal	200	1
Miguelita Creek	Lochridge to Educational Park Dr.	10+00	25+00	E	Non-Tidal	300	1

C: Concrete	CB: Concrete Bottom	DB: Debris Basin
E: Earth	EC: Excavated Channel	LF: Low Flow

Table 2A

San Francisco Bay Area Region
Multi-Year Sediment Removal Sites
Sampling Locations and Frequency
(Average Annual Continuous Core Sediment Sampling)

(Continued)

Creek	Location	Length of Work Area		Type of Site	Tidal / Non- Tidal	Estimated Annual Sediment Volume (cy)	Average Number of Samples
		Beg. Sta. (ft)	End Sta. (ft)				
	d/s Jackson to Jackson	37+00	44+00	E	Non-Tidal	150	1
Upper Penitencia Crk	King	35+00	38+00	E	Non-Tidal	60	1
	Maybury	55+00	57+00	E	Non-Tidal	40	1
	near Maybury	71+00	72+00	E	Non-Tidal	20	1
Lower Penitencia Crk	to CA Circle	0000	50+00	E,C	Tidal	4,000	2
	Calavaras to d/s Hetch Hetchy	112+00	140+00	E,C	Non-Tidal	1,000	1
Sierra Creek	Berryessa to Mauna Kea	0000	72+00	E	Non-Tidal	750	1
Upper Silver Creek	to Hwy 101	0000	35+00	C	Non-Tidal	200	1
Tularcitos Creek	to Hwy 680	0000	38+00	E	Non-Tidal	700	1
Norwood Creek	to White Road	0000	32+00	E	Non-Tidal	360	1
Thompson Creek	u/s Quimby	0000	20+00	E	Non-Tidal	100	1
TOTAL						73,070	99

C: Concrete
CB: Concrete Bottom
DB: Debris Basin
E: Earth
EC: Excavated Channel
LF: Low Flow

Table 2B
San Francisco Bay Area Region
Multi-Year Sediment Removal Sites
Sampling Locations and Frequency
(Average Annual Discrete Sediment Sampling)

Creek	Location	Length of Work Area		Type of Site	Tidal / Non-Tidal	Estimated Annual Sediment Volume (cy)	Average Number of Samples	Average Number of Composite Samples
		Beg. Sta. (ft)	End Sta. (ft)					
Lower Peninsula Watershed (NorthWest Zone)								
Adobe Creek	Hwy 101 to Lewis	130+00	170+00	C	Non-Tidal	1,800	5	2
	Near El Camino	220+00	250+00	C	Non-Tidal	680	2	1
Baron Creek Debris Basin	Foothill to Miranda	159+00	162+00	E	Non-Tidal	500	5	2
Matadero Creek	Hwy 101 to Rosa	94+00	140+00	EB,C	Non-Tidal	1,560	3	1
Permanente Diversion	Near Grant	50+00	65+00	C	Non-Tidal	200	1	1
Permanente Creek	Hwy 101 to Charleston	113+00	126+00	E	Non-Tidal	400	1	1
	d/s Portland	340+00	350+00	C	Non-Tidal	300	1	1
San Francisquito Creek	d/s Hwy 101	70+00	80+00	E	Tidal	1,350	5	2
Stevens Creek	Crit. To L'Avenida	88+00	130+00	E	Tidal/Non-Tidal	6,000	12	3
	near Moffet	150+00	165+00	C	Non-Tidal	1,000	2	1
West Valley Watershed (North Central Zone)								
Calabazas Creek	d/s Hwy 101	82+00	102+00	E	Non-Tidal	900	3	1
	near Pomeroy	250+00	252+00	C	Non-Tidal	80	1	1
	near Georgetown	194+00	196+00	C	Non-Tidal	80	1	1
	Comer Debris Basin	599+00	605+00	E	Non-Tidal	240	1	1
Junipero Serra Channel	to Blaney	0000	60+00	E	Non-Tidal	100	1	1
Regnart Creek	near Kim	80+00	85+00	E	Non-Tidal	100	1	1
Rodeo Creek	Dandridge	3+00	4+50	C	Non-Tidal	150	1	1
	Rainbow	12+00	13+00	C	Non-Tidal	15	1	1

C: Concrete	CB: Concrete Bottom	DB: Debris Basin
E: Earth	EC: Excavated Channel	LF: Low Flow

Table 2B
San Francisco Bay Area Region
Multi-Year Sediment Removal Sites
Sampling Locations and Frequency
(Average Annual Discrete Sediment Sampling)

Creek	Location	Length of Work Area		Type of Site	Tidal / Non-Tidal	Estimated Annual Sediment Volume (cy)	Average Number of Samples	Average Number of Composite Samples
		Beg. Sta. (ft)	End Sta. (ft)					
	Dartmore	27+00	28+00	C	Non-Tidal	15	1	1
San Tomas Aquino Creek	d/s Monroe	0000	225+00	E,C	Tidal/Non-Tidal	9,000	30	8
	Westmont Debris Basin	637+00	642+00	E	Non-Tidal	1,650	6	2
Saratoga Creek	to Warburton	0000	34+00	E	Non-Tidal	3,000	6	2
	near Lawrence, Hwy 280	170+00	200+00	E	Non-Tidal	500	5	2
	Prospect	304+00	306+00	C	Non-Tidal	50	1	1
Smith Creek	to Elam	0000	17+00	C,E	Non-Tidal	20	1	1
Sunnyvale East Channel	to Hwy 101	0000	110+00	E	Tidal/Non-Tidal	3,200	8	2
Sunnyvale West Channel	Carl to Hwy 101	50+00	134+00	E	Tidal/Non-Tidal	900	5	2
El Camino Storm Drain	to Monroe	0000	52+00	C	Non-Tidal	120	2	1
Guadalupe Watershed (Central Zone)								
Canoas Creek	All	0000	390+00	C	Non-Tidal	4,800	12	3
Greystone Creek	to Almaden	0000	21+00	E	Non-Tidal	500	5	2
Guadalupe River	d/s Montague	315+00	390+00	EC	Tidal	6,000	10	3
	d/s Trimble	390+00	450+00	E	Non-Tidal	2,400	8	2
	St. John St.	663+00	670+00	C	Non-Tidal	1,000	3	1
Ross Creek	Cherry	27+00	28+50	C	Non-Tidal	100	1	1
	Jarvis	43+00	44+00	C	Non-Tidal	100	1	1
	u/s Jarvis	47+00	50+00	C	Non-Tidal	100	1	1

C: Concrete
E: Earth

CB: Concrete Blocks
EC: Excavated Channel

DB: Debris Basin
LF: Low Flow

Table 2B
San Francisco Bay Area Region
Multi-Year Sediment Removal Sites
Sampling Locations and Frequency
(Average Annual Discrete Sediment Sampling)

Creek	Location	Length of Work Area		Type of Site	Tidal / Non-Tidal	Estimated Annual Sediment Volume (cy)	Average Number of Samples	Average Number of Composite Samples
		Beg. Sta. (ft)	End Sta. (ft)					
	Meridian	71+00	72+00	C	Non-Tidal	100	1	1
	d/s Leigh	151+00	153+00	C	Non-Tidal	100	1	1
	d/s Union	178+00	181+00	C	Non-Tidal	100	1	1
	Los Gatos Almaden	204+00	205+00	C	Non-Tidal	100	1	1
	Almaden Valley Pipeline	222+00	223+25	C	Non-Tidal	100	1	1
Guadalupe Creek	at Camden Road	1165+00	1170+00	E	Non-Tidal	150	1	1
Randol Creek	Rajkovitch to u/s Viewpoint	45+00	80+00	E	Non-Tidal	300	3	1
Coyote Watershed (East Zone)								
Berryessa Creek	to Los Coches Creek	0000	93+50	E	Tidal	7,500	15	4
	Los Coches to Montague	93+50	165+00	E	Non-Tidal	1,050	4	1
Calera Creek	to Drop Structure	0000	31+00	E	Non-Tidal	600	2	1
	to Russell Lane	31+00	48+00	E	Non-Tidal	300	2	1
Fisher Creek	Leguna	145+00	155+00	E	Non-Tidal	100	1	1
Los Coches Creek	to u/s Hwy 680	0000	24+00	E	Non-Tidal	300	1	1
Lower Silver Creek	d/s McKee	38+00	52+00	E	Non-Tidal	750	2	1
	u/s Alum Rock	88+00	100+00	C	Non-Tidal	180	1	1
	Jackson to Capital	128+00	155+00	E	Non-Tidal	150	2	1
	u/s No. Babb	168+00	173+00	E	Non-Tidal	50	1	1
	d/s Martha Street	200+00	205+00	E	Non-Tidal	150	1	1
	Cropley to Morrill	230+00	234+00	E	Non-Tidal	450	2	1
	d/s Piedmont	284+00	298+00	E	Non-Tidal	750	3	1

C: Concrete
E: Earth
CB: Concrete Bottom
EC: Excavated Channel
DB: Debris Basin
LF: Low Flow

Table 2B
San Francisco Bay Area Region
Multi-Year Sediment Removal Sites
Sampling Locations and Frequency
(Average Annual Discrete Sediment Sampling)

Creek	Location	Length of Work Area		Type of Site	Tidal / Non-Tidal	Estimated Annual Sediment Volume (cy)	Average Number of Samples	Average Number of Composite Samples
		Beg. Sta. (ft)	End Sta. (ft)					
	Cunningham to Quimby	245+00	315+00	E	Non-Tidal	3,000	10	3
	King to Pipe	367+00	377+50	E	Non-Tidal	200	1	1
Miguelita Creek	Lochridge to Educational Park Dr.	10+00	25+00	E	Non-Tidal	300	1	1
	d/s Jackson to Jackson	37+00	44+00	E	Non-Tidal	150	1	1
Upper Penitencia Crk	King	35+00	38+00	E	Non-Tidal	60	1	1
	Maybury	55+00	57+00	E	Non-Tidal	40	1	1
	near Maybury	71+00	72+00	E	Non-Tidal	20	1	1
Lower Penitencia Crk	to CA Circle	0000	50+00	E,C	Tidal	4,000	5	2
	Calavaras to d/s Hetch Hetchy	112+00	140+00	E,C	Non-Tidal	1,000	3	1
Sierra Creek	Berryessa to Mauna Kea	0000	72+00	E	Non-Tidal	750	3	1
Upper Silver Creek	to Hwy 101	0000	35+00	C	Non-Tidal	200	1	1
Tularcitos Creek	to Hwy 680	0000	38+00	E	Non-Tidal	700	4	1
Norwood Creek	to White Road	0000	32+00	E	Non-Tidal	360	2	1
Thompson Creek	u/s Quimby	0000	20+00	E	Non-Tidal	100	1	1
TOTAL						73,070	234	99

C: Concrete
CB: Concrete Bottom
DB: Debris Basin
E: Earth
EC: Excavated Channel
LF: Low Flow

Table 2C

Multi-Year Sediment Removal Sites
Sampling Locations and Frequency
(Average Annual Residual Sediment Sampling)

Creek	Location	Length of Work Area		Type of Site	Tidal / Non-Tidal	Estimated Annual Sediment Volume (cy)	Average Number of Samples
		Beg. Sta. (ft)	End Sta. (ft)				
Lower Peninsula Watershed (NorthWest Zone)							
Adobe Creek	Hwy 101 to Lewis	130+00	170+00	C	Non-Tidal	1,800	0
	Near El Camino	220+00	250+00	C	Non-Tidal	680	0
Baron Creek Debris Basin	Foothill to Miranda	159+00	162+00	E	Non-Tidal	500	2
Matadero Creek	Hwy 101 to Rosa	94+00	140+00	C	Non-Tidal	1,560	0
Permanente Diversion	Near Grant	50+00	65+00	C	Non-Tidal	200	0
Permanente Creek	Hwy 101 to Charleston	113+00	126+00	E	Non-Tidal	400	1
	d/s Portland	340+00	350+00	C	Non-Tidal	300	0
San Francisquito Creek	d/s Hwy 101	70+00	80+00	E	Tidal	1,350	2
Stevens Creek	Crit. To L'Avenida	88+00	130+00	E	Tidal/Non-Tidal	6,000	3
	near Moffet	150+00	165+00	C	Non-Tidal	1,000	0
West Valley Watershed (North Central Zone)							
Calabazas Creek	d/s Hwy 101	82+00	102+00	E	Non-Tidal	900	1
	near Pomeroy	250+00	252+00	C	Non-Tidal	80	0
	near Georgetown	194+00	196+00	C	Non-Tidal	80	0
	Comer Debris Basin	599+00	605+00	E	Non-Tidal	240	1
Junipero Serra Channel	to Blaney	0000	60+00	E	Non-Tidal	100	1
Regnart Creek	near Kim	80+00	85+00	E	Non-Tidal	100	1
Rodeo Creek	Dandridge	3+00	4+50	C	Non-Tidal	150	0
	Rainbow	12+00	13+00	C	Non-Tidal	15	0

C: Concrete
E: Earth

C: Concrete Bottom
EC: Excavated Channel

DB: Debris Basin
LF: Low Flow

Table 2C

Multi-Year Sediment Removal Sites
Sampling Locations and Frequency
(Average Annual Residual Sediment Sampling)
(Continued)

Creek	Location	Length of Work Area		Type of Site	Tidal / Non-Tidal	Estimated Annual Sediment Volume (cy)	Average Number of Samples
		Beg. Sta. (ft)	End Sta. (ft)				
	Dartmore	27+00	28+00	C	Non-Tidal	15	0
San Tomas Aquino Creek	d/s Monroe	0000	225+00	E,C	Tidal/Non-Tidal	9,000	4
	Westmont Debris Basin	637+00	642+00	E	Non-Tidal	1,650	2
Saratoga Creek	to Warburton	0000	34+00	E	Non-Tidal	3,000	2
	near Lawrence, Hwy 280	170+00	200+00	E	Non-Tidal	500	2
	Prospect	304+00	306+00	C	Non-Tidal	50	0
Smith Creek	to Elam	0000	17+00	C,E	Non-Tidal	20	1
Sunnyvale East Channel	to Hwy 101	0000	110+00	E	Tidal/Non-Tidal	3,200	2
Sunnyvale West Channel	Carl to Hwy 101	50+00	134+00	E	Tidal/Non-Tidal	900	2
El Camino Storm Drain	to Monroe	0000	52+00	C	Non-Tidal	120	0
Guadalupe Watershed (Central Zone)							
Canoas Creek	All	0000	390+00	C	Non-Tidal	4,800	0
Greystone Creek	to Almaden	0000	21+00	E	Non-Tidal	500	2
Guadalupe River	d/s Montague	315+00	390+00	EC	Tidal	6,000	3
	d/s Trimble	390+00	450+00	E	Non-Tidal	2,400	2
	St. John St.	663+00	670+00	C	Non-Tidal	1,000	0
Ross Creek	Cherry	27+00	28+50	C	Non-Tidal	100	0
	Jarvis	43+00	44+00	C	Non-Tidal	100	0

C: Concrete
E: Earth
CB: Concrete Bottom
EC: Excavated Channel
DB: Debris Basin
LF: Low Flow

Table 2C

Multi-Year Sediment Removal Sites
Sampling Locations and Frequency
(Average Annual Residual Sediment Sampling)
(Continued)

Creek	Location	Length of Work Area		Type of Site	Tidal / Non-Tidal	Estimated Annual Sediment Volume (cy)	Average Number of Samples
		Beg. Sta. (ft)	End Sta. (ft)				
	u/s Jarvis	47+00	50+00	C	Non-Tidal	100	0
	Meridian	71+00	72+00	C	Non-Tidal	100	0
	d/s Leigh	151+00	153+00	C	Non-Tidal	100	0
	d/s Union	178+00	181+00	C	Non-Tidal	100	0
	Los Gatos Almaden	204+00	205+00	C	Non-Tidal	100	0
	Almaden Valley Pipeline	222+00	223+25	C	Non-Tidal	100	0
Guadalupe Creek	at Camden Road	1165+00	1170+00	E	Non-Tidal	150	1
Randol Creek	Rajkovitch to u/s Viewpoint	45+00	80+00	E	Non-Tidal	300	1
Coyote Watershed (East Zone)							
Berryessa Creek	to Los Coches Creek	0000	93+50	E	Tidal	7,500	4
	Los Coches to Montague	93+50	165+00	E	Non-Tidal	1,050	1
	Cropley to Morrill	230+00	234+00	E	Non-Tidal	450	1
	d/s Piedmont	284+00	298+00	E	Non-Tidal	750	1
Calera Creek	to Drop Structure	0000	31+00	E	Non-Tidal	600	1
	to Russell Lane	31+00	48+00	E	Non-Tidal	300	1
Fisher Creek	Leguna	145+00	155+00	E	Non-Tidal	100	1
Los Coches Creek	to u/s Hwy 680	0000	24+00	E	Non-Tidal	300	1
Lower Silver Creek	d/s McKee	38+00	52+00	E	Non-Tidal	750	1
	u/s Alum Rock	88+00	100+00	C	Non-Tidal	180	0
	Jackson to Capital	128+00	155+00	E	Non-Tidal	150	1
	u/s No. Babb	168+00	173+00	E	Non-Tidal	50	1

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LF: Low Flow

Table 2C

Multi-Year Sediment Removal Sites
Sampling Locations and Frequency
(Average Annual Residual Sediment Sampling)
(Continued)

Creek	Location	Length of Work Area		Type of Site	Tidal / Non-Tidal	Estimated Annual Sediment Volume (cy)	Average Number of Samples
		Beg. Sta. (ft)	End Sta. (ft)				
	d/s Martha Street	200+00	205+00	E	Non-Tidal	150	1
	Cunningham to Quimby	245+00	315+00	E	Non-Tidal	3,000	3
	King to Pipe	367+00	377+50	E	Non-Tidal	200	1
Miguelita Creek	Lochridge to Educational Park Dr.	10+00	25+00	E	Non-Tidal	300	1
	d/s Jackson to Jackson	37+00	44+00	E	Non-Tidal	150	1
Upper Penitencia Crk	King	35+00	38+00	E	Non-Tidal	60	1
	Maybury	55+00	57+00	E	Non-Tidal	40	1
	near Maybury	71+00	72+00	E	Non-Tidal	20	1
Lower Penitencia Crk	to CA Circle	0000	50+00	E,C	Tidal	4,000	2
	Calavaras to d/s Hetch Hetchy	112+00	140+00	E,C	Non-Tidal	1,000	1
Sierra Creek	Berryessa to Mauna Kea	0000	72+00	E	Non-Tidal	750	1
Upper Silver Creek	to Hwy 101	0000	35+00	C	Non-Tidal	200	0
Tularcitos Creek	to Hwy 680	0000	38+00	E	Non-Tidal	700	1
Norwood Creek	to White Road	0000	32+00	E	Non-Tidal	360	1
Thompson Creek	u/s Quimby	0000	20+00	E	Non-Tidal	100	1
TOTAL						**73,070**	**67**

C: Concrete
E: Earth
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EC: Excavated Channel
DB: Debris Basin
LF: Low Flow

Sample Depth

The sampling depth will be determined in the field. At each sampling location, the staff collecting the samples shall make an estimate of the depth of the sediment using visual clues and/or existing data. Once the depth has been estimated, random number generator tables (see Appendix A) shall be used to determine the depth at which the samples shall be collected. Samples shall be collected at the ground surface and at even 1-foot intervals below the ground surface.

For example, if at a given sampling location, visual observations and data provided by the District's Operations and Maintenance staff indicates that the sediment depth is 3 feet, using random number generator tables in Appendix A, a random number shall be selected between the range of zero and three. If the random number selected is zero, then the sample shall be collected at 0 feet bgs (at the ground surface).

In the event that the depth of the sediment is less than 1 foot, then the sample shall be collected at the surface.

Samples will be collected up to a maximum depth of 4 feet bgs, because collection of samples below that depth is prohibitively difficult due to the finite strength of the individual collecting the sample, and the wet properties of the sediment, which may cause a borehole to collapse.

In some locations it may even be infeasible to collect a sample at 3 or 4 feet bgs due to the wet, unstable nature of the sediments. In the event that it is infeasible to collect a sample at the depth interval specified, the sample shall be collected at the deepest interval possible (using 1-foot increments).

The selection of sampling locations is illustrated in Appendix B.

Discrete Sample Compositing

Samples shall be composited by the laboratory into 4-point composite samples. Compositing of samples will be performed in the laboratory by a qualified laboratory analyst under a controlled environment as required and specified in the laboratory's Quality Assurance (QA) and Quality Control (QC) Plan to ensure the minimum disturbance and maintain the integrity of the sample for subsequent chemical analyses.

If the number of samples collected at a creek site is not evenly divisible by four, some samples may be 2-point composites or 3-point composites. For example, if seven samples are collected at a creek, the samples will be composited into one 4-point composite sample and one 3-point composite sample. Only samples from the same creek site will be composited together.

Only adjacent samples on the same creek will be composited together. For example, if eight samples are collected on a single creek and are numbered one through eight from the downstream end to the upstream end, samples one through four shall be composited together, and samples five through eight shall be composited together.

RESIDUAL SEDIMENT SAMPLING

The purpose of residual sediment sampling is to conduct limited characterization of sediment left behind after sediment removal from earthen channels and creeks. The exposed sediment in the channel/creek bottom will be sampled and analyzed for total mercury and PCB.

Sampling Locations

The samples will be collected from continuous core sediment sample locations previously discussed in this section on "Sampling Methods" by using hand auger from within 1 foot below the maximum depth of dredging at each earthen channel/creek site. After collection of continuous core sample, a hand auger or a backhoe/excavator, if warranted, will be used to collect a discrete sample within 1 foot below depth, and analyzed separately for total mercury and PCB.

The residual sediment sampling locations are locations that have the potential for detecting total mercury and PCB, if any. Such sampling locations shall be determined based on criteria such as known locations of outfalls, storm water runoff locations, and by visually identifying potential sediment deposition areas and industrial sources along the stream stretches where dredging is planned. In this regard, the District will identify the residual sediment sampling locations that best meet these criteria, possibly with the DFG and/or Regional Board during a field visit.

Sampling Frequency

Residual sediment samples will be collected at the same frequency as the continuous core sediment samples on earthen channels only.

Table 2C presents the following information: the sediment removal sites, the approximate location of the sites, the length of work area by stations of the upstream and downstream limits of the sites, the type of site (tidal/nontidal, lining type), the estimated average annual volume of sediment generated at each site, and the average number of sampling locations at each site.

FLINT DEBRIS BASIN SAMPLING

The Flint Debris Basin is a sediment basin located outside the natural stream in the upper watershed. This large sediment basin was constructed to intercept the large sediment load generated by the upstream unstable watershed during high stream flow events. Sediment captured in the basin remains until the District removes it. The basin is not dynamic like natural streams and the sediment-sampling requirement has been modified.

The Flint Debris Basin will be sampled at five locations:

- One continuous core sample taken at the location that has the potential for detecting maximum number of contaminants at highest concentrations at a depth of 11 to 12 feet.
- Residual sample to be taken below this sample at a depth of 12 to 13 feet.

Four continuous core samples, evenly spaced throughout the basin, taken at a depth of 6 feet.

SAMPLING PROCEDURES

This section describes sampling procedures applicable to both the continuous core sampling and representative sampling methods.

SAMPLE COLLECTION

All samples shall be collected by means of a hand trowel, a hand auger, or another sampling method approved by the regulatory agencies. The individual collecting the sample will have the discretion of choosing the sampling method which is the most efficient to perform.

Sampling will be conducted in accordance with the methods described below:

Hand Trowel Procedure

1. Remove vegetation and woody debris from the ground surface.
2. If collecting a subsurface sample, use a shovel to dig down to the desired sampling interval.
3. Use a stainless-steel hand trowel to collect soil.
4. Place soil in an appropriate sampling container.
5. Replace all excavated soils to their original location (i.e., backfill the sampling hole).

Hand Auger Procedure

1. Remove vegetation and woody debris from the ground surface.
2. Use the hand auger to advance down to the top of the sampling interval.
3. Use a hand auger to collect soil from the desired depth.
4. Use a clean (decontaminated) tool to scoop the soil out of the auger and place in an appropriate sampling container.
5. Replace all excavated soils to their original location (i.e., backfill the sampling hole).
6. If hand auger refusal is encountered, sample will be collected from an alternate location.

Continuous Core Sediment Sampling

Continuous core sediment samples from sediment designated for removal will be collected using hand auger at a frequency of a maximum of one sample per site. Each continuous core sample will be composited by the laboratory, and analyses will be performed on the composite sample.

Discrete Sediment Sampling

Discrete sediment samples from sediment designated for removal will be collected from desired depths using hand auger. Samples will be composited by the laboratory, and analyses will be performed on the composite sample.

Residual Sediment Sampling

A hand auger will be used to collect sediment samples within 1 foot below dredging depth. If field subsurface conditions do not allow sampling by hand auger, a backhoe/excavator will be used to expose sediment to specified depth and hand trowel or hand auger will be used to collect sample.

Deep Sampling

For samples to be collected at a depth greater than 4 feet, a backhoe/excavator will be used to expose sediment to specified depth and hand trowel or hand auger will be used to collect sample.

Samples shall be collected by District staff and/or by a contractor.

SAMPLE CONTAINERS AND SAMPLE VOLUME

All samples shall be collected using wide-mouthed glass jars or other sampling containers as directed or supplied by the laboratory.

Sampling volume and number of containers necessary shall be specified by the District's laboratory. It is anticipated that multiple containers of sediment will need to be collected at each location.

DECONTAMINATION PROCEDURES

All equipment used to collect soil samples (hand trowel or hand auger) shall be decontaminated prior to collecting each sample. Equipment shall be decontaminated by washing the equipment with a nonphosphate detergent solution and rinsing the equipment twice with water. The final rinse shall be with deionized or distilled water.

The decontamination liquids will be temporarily stored in labeled containers and transported to the District's Maintenance Yard (Corporation Yard). Upon confirmation by chemical analyses, the decontamination liquids will be disposed appropriately.

SAMPLE PRESERVATION

All samples shall be immediately preserved by placing the samples in an insulated cooler with ice. Samples may also be stored in a refrigerator. All samples shall be kept cool.

A vial of water shall be included in all insulated coolers. The laboratory shall immediately record the temperature of the vial upon receipt of the samples.

CHAIN OF CUSTODY PROCEDURES

Standard chain of custody procedures shall be used throughout the sampling collection procedures. A chain of custody shall be prepared for all samples. Each individual who has responsibility for the samples is required to sign the chain of custody upon relinquishing the samples to another party. The receiving party taking custody of samples shall also sign the chain of custody form.

When in the field, samples shall always be in sight of the individual responsible for the samples, or the samples shall be stored within a locked vehicle. If the samples are stored in an office prior to delivery to the laboratory, the samples shall be stored in a secure location. Applicable sample storage and preservation procedures shall be followed.

A sample chain of custody is presented in Appendix C.

FIELD SOIL SAMPLING LOG

A field soil sampling log shall be filled out for the samples collected at each location. The log will contain the following information: date and time, site location, responsible sample collector, sampling methods, sampling location, sampling depth, number of sampling containers, specific site conditions observed at the time of sample collection, analysis requested, and other information that describes the actual sampling event.

A sample field soil sampling log is presented in Appendix D.

SURVEY OF SAMPLING LOCATIONS

All sampling locations will be identified by station numbers.

ANALYTICAL PROCEDURES

The analytical tests and average annual numbers of samples proposed for the continuous core, discrete, and residual sediment samples are summarized in Tables 3A, 3B, and 3C respectively. Tables 3A, 3B, 3C, and 3D present the specific analysis to be performed at each sediment removal site, and Table 4 presents the test methods used for analysis. The continuous core sediment sample locations will be determined during pre-sampling field activities. Proposed standard analytical detection (reporting) limits, and a supporting letter from Sequoia Analytical Laboratory are included in Appendix E. As explained in the letter from Sequoia, lower detection limits may be achievable for specific compounds.

Presented below is a description of the constituents of concern and the rationale used in the selection of analytical test methods.

RATIONALE FOR ANALYTICAL TEST METHOD SELECTION

The rationale used for selecting test methods is described below:

Metals

Metals are naturally-occurring elements which are present in sediments and soils throughout the Santa Clara Valley. Historic mining activities has increased metal levels in some watersheds. Metals may also be deposited in the stream by nonpoint source runoff.

Landfills commonly request that soils be analyzed for total concentrations of "Title 26 metals," which includes antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, molybdenum, nickel, selenium, silver, thallium, vanadium, and zinc for a grand total of 17 metals.

Class III landfills may consider both the total and soluble levels of metals; therefore, it is often advisable to test soil for both the total levels of metals, using standard extraction methods, and soluble levels of metals, using the Waste Extraction Test (WET) extraction method. Soluble levels of metals will be determined using the standard WET extraction (which utilizes citric acid).

Selected Test Methods and Frequency of Testing

- All samples except the residual sediment samples shall be tested for total Title 26 metals by EPA Method 6010 and EPA 7000 series test methods.
- All samples except the residual sediment samples will be tested for soluble Title 26 metals by EPA Methods 6010 and 7000 series and standard WET extraction method (citric acid).

Mercury—Total and Methyl-Mercury

Mercury is a concern due to its presence in some watersheds as a result of historic operations at former mines. Many mercury mines were active up to the 1970s. Past mining operations allowed mining tailings and debris to discharge to some creeks and this has increased mercury levels in sediments and soils in those watersheds. Analysis of total mercury by EPA Method 7471 will be performed for all samples taken from Guadalupe River. Guadalupe Creek, Los Gatos Creek, Alamitos Creek, Coyote Creek and Randal Creek. Analysis of methyl-mercury by EPA Method 1630 modified will be performed for all samples taken from Guadalupe River. Guadalupe Creek, Los Gatos Creek, Alamitos Creek, Coyote Creek, and Randol Creek.

Selected Test Methods and Frequency of Testing

- All samples collected from Guadalupe River. Guadalupe Creek, Los Gatos Creek, Alamitos Creek, Coyote Creek, and Randol Creek will be analyzed for total mercury by EPA Method 7471.

- All samples collected from Guadalupe River. Guadalupe Creek, Los Gatos Creek, Alamitos Creek, Coyote Creek, and Randol Creek will be analyzed for methyl-mercury by EPA Method 1630 modified.

Pesticides and Organophosphorous Compounds

Pesticides have been historically used throughout the Santa Clara Valley for agricultural purposes. Both pesticides and organophosphorous compounds may have been deposited in the sediments by nonpoint source runoff. Analysis of pesticides will be performed by EPA Method 8081, all samples will be tested for pesticides. Analysis of organophosphorous compounds will be performed by EPA Method 8141 on samples taken from earthen channels/creeks.

Selected Test Methods and Frequency of Testing

All samples except the residual sediment samples will be tested for pesticides by EPA Method 8081. All samples from earthen channels/creeks, except the residual sediment samples will be tested for organophosphorous compounds by EPA Method 8141.

Unless specifically indicated above, testing shall be distributed evenly throughout the sites.

Herbicide Compounds

The District applies herbicides on upland maintenance roads to manage vegetation and instream to manage aquatic vegetation. Roundup, Rodeo, and Pendulum are the most commonly applied compounds. Gallery, Surflan, and Telar are also applied.

Selected Test Methods and Frequency of Testing

Analysis of Roundup and Rodeo will be performed by EPA Method 547s modified on samples taken from ten sites where the compound was applied, with the largest volume of sediment to be removed. Analysis of Pendulum will be performed by EPA Method 8141 modified on samples taken from ten sites where the compound was applied, with the largest volume of sediment to be removed. Analysis of Gallery will be performed by Method CDFA modified on samples taken from three sites where the compound was applied, with the largest volume of sediment to be removed. Analysis of Surflan will be performed by EPA Method 632 modified on samples taken from three sites where the compound was applied, with the largest volume of sediment to be removed. Analysis of Telar will be performed by EPA Method 632 modified on samples taken from three sites where the compound was applied, with the largest volume of sediment to be removed.

Polychlorinated Biphenyls and Total Mercury

Sediment samples collected from the residual sediment at selected locations will be analyzed for PCB and total mercury in an attempt to characterize sediments that may be subject to erosion and transport during flows.

Selected Test Method and Frequency of Testing

All residual sediment samples collected from earthen channels/creeks will be tested for total mercury and PCB by EPA Methods 7471 and 8082, respectively.

Solvents

Solvents are generated by industrial activities and may be deposited in sediments by nonpoint sources runoff. Solvents are highly volatile, so it is not likely that significant quantities of solvents will be detected, since the sediments are open to the atmosphere.

None of the seventeen (17) composite samples from eight (8) creeks, analyzed for halogenated volatiles in 1997 revealed presence of halogenated volatiles above detection limits. Also, none of the fifty-four (54) composite samples from nineteen (19) creeks, analyzed for halogenated volatiles in 1998 revealed presence of halogenated volatiles above detection limits. This comparison of sediment analyses was discussed at the 1998 Lessons Learned meeting.

Testing of samples by EPA Method 8010 for halogenated volatiles was not performed in 1999, 2000, or 2001 and will also not be performed during the Multi-Year Sediment Removal Program.

Polynuclear Aromatic Hydrocarbons

PAH is generated by industrial activities and may be deposited in sediments by nonpoint source runoff. The sediments will be tested by EPA Method 8310 for PAH.

Selected Test Method and Frequency of Testing

All samples except the residual sediment samples will be analyzed for PAH by EPA Method 8310.

Table 3A

Multi-Year Sediment Removal Sites
Summary of Analysis Performed at Each Site(a)
(Average Annual Continuous Core Sediment Sampling)

Site No.	Sediment Removal Sites	Average Annual Estimated Volume Per Creek (CY)	Average Annual Number of Samples	Average Annual Number of Samples Tested for Individual Analytes																
				Total Metals	Metals WET	Mercury	Pesticides	Organo(b). Comp.	PAH	Moisture Content	Grain Size	THE	Toxicity(c)	TOC	Asbestos	Chloride(c)	pH	Total Sulfides	Ammonia	Atterberg Limits
Lower Peninsula Watershed (Northwest Zone)																				
1	Adobe	2,480	1	1	1	0	1	0	1	1	1	1	0	1	1	0	1	1	1	1
2	Baron Debris Basin	500	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
3	Matadero	1,560	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
4	Permanente Diversion	200	1	1	1	0	1	0	1	1	1	1	0	1	1	0	1	1	1	1
5	Permanente	700	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
6	San Francisquito	1,350	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7	Stevens	7,000	2	2	2	0	2	1	2	1	1	1	2	1	1	1	1	1	1	1
West Valley Watershed (North Central Zone)																				
8	Calabazas	1,300	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
9	Junipero Serra Channel	100	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
10	Regnart	100	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
11	Rodeo	180	1	1	1	0	1	0	1	1	1	1	0	1	1	0	1	1	1	1
12	San Tomas Aquino	10,650	3	3	3	0	3	1	3	1	1	1	1	1	1	1	1	1	1	1
13	Saratoga	3,550	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1

Table 3A
Multi-Year Sediment Removal Sites
Summary of Analysis Performed at Each Site(a)
(Average Annual Continuous Core Sediment Sampling)

Site No.	Sediment Removal Sites	Average Annual Estimated Volume Per Creek (CY)	Average Annual Number of Samples	Average Annual Number of Samples Tested for Individual Analytes																
				Total Metals	Metals WET	Mercury	Pesticides	Organo (b) Comp.	PAH	Moisture Content	Grain Size	THE	Toxicity (c)	TOC	Asbestos	Chloride(c)	pH	Total Sulfides	Ammonia	Atterberg Limits
14	Smith	20	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
15	Sunnyvale East	3,200	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
16	Sunnyvale West	900	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
17	El Camino Storm Drain	120	1	1	1	0	1	0	1	1	1	1	0	1	1	0	1	1	1	1
Guadalupe Watershed (Central Zone)																				
18	Canoas	4,800	2	2	2	0	2	0	2	1	1	1	0	1	1	0	1	1	1	1
19	Greystone	500	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
20	Guadalupe River	9,400	3	3	3	3	3	1	3	1	1	1	2	1	1	1	1	1	1	1
21	Ross	800	1	1	1	0	1	0	1	1	1	1	0	1	1	0	1	1	1	1
22	Guadalupe	150	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1
23	Randol	300	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1
Coyote Watershed (East Zone)																				
24	Berryessa	9,750	3	3	3	0	3	1	3	1	1	1	1	1	1	1	1	1	1	1
25	Calera	900	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
26	Fisher	100	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
27	Los Coches	300	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
28	Lower Silver	4,480	2	2	2	0	2	1	2	1	1	1	0	1	1	0	1	1	1	1

Table 3B

Multi-Year Sediment Removal Sites
Summary of Analysis Performed at Each Site
(Average Annual Discrete Sediment Sampling)

Site No.	Sediment Removal Sites	Average Annual Estimated Volume Per Creek (CY)	Average Annual Number of Samples	Average Annual Number of Samples Tested for Individual Analytes																		
				Total Metals	Metals WET	Mercury	Pesticides	Organo$^{(b)}$. Comp.	PAH	Moisture Content	Grain Size	THE	Toxicity$^{(c)}$	TOC	Asbestos	Chloride$^{(c)}$	pH	Total Sulfides	Ammonia	Atterberg Limits
29	Miguelita	450	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
30	Upper Penitencia	120	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
31	Lower Penitencia	5,000	2	2	2	0	2	1	2	1	1	1	1	1	1	1	1	1	1	1
32	Sierra	750	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
33	Upper Silver	200	1	1	1	0	1	0	1	1	1	1	0	1	1	0	1	1	1	1
34	Tularcitos	700	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
35	Norwood	360	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
36	Thompson	100	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
	TOTAL	**73,070**	**46**	**46**	**46**	**5**	**46**	**29**	**46**	**36**	**36**	**36**	**10**	**36**	**36**	**8**	**36**	**36**	**36**	**36**

Table 3B
Multi-Year Sediment Removal Sites
Summary of Analysis Performed at Each Site
(Average Annual Discrete Sediment Sampling)

Site No.	Sediment Removal Sites	Average Annual Estimated Volume Per Creek (CY)	Average Annual Number of Samples	Average Annual Number of Composites	Average Annual Number of Samples Tested for Individual Analytes																
					Total Metals	Metals WET	Mercury	Pesticides	Organo[a] Comp.	PAH	Moisture Content	Grain Size	THE	Toxicity[b]	TOC	Asbestos	Chloride[b]	pH	Total Sulfides	Ammonia	Atterberg Limits
Lower Peninsula Watershed (Northwest Zone)																					
1	Adobe	2,480	3	1	1	1	0	1	0	1	1	1	1	0	1	1	0	1	1	1	1
2	Baron Debris Basin	500	1	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
3	Matadero	1,560	2	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
4	Permanente Diversion	200	1	1	1	1	0	1	0	1	1	1	1	0	1	1	0	1	1	1	1
5	Permanente	700	1	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
6	San Francisquito	1,350	2	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7	Stevens	7,000	7	2	2	2	0	2	2	2	2	2	2	1	2	2	1	2	2	2	2
West Valley Watershed (North Central Zone)																					
8	Calabazas	1,300	2	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
9	Junipero Serra Channel	100	1	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
10	Regnart	100	1	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
11	Rodeo	180	1	1	1	1	0	1	0	1	1	1	1	0	1	1	0	1	1	1	1

Table 3B

Multi-Year Sediment Removal Sites
Summary of Analysis Performed at Each Site
(Average Annual Discrete Sediment Sampling)

(Continued)

Site No.	Sediment Removal Sites	Average Annual Estimated Volume Per Creek (CY)	Average Annual Number of Samples	Average Annual Number of Composites	Average Annual Number of Samples Tested for Individual Analytes																	
					Total Metals	Metals WET	Mercury	Pesticides	Organo . Comp. (a)	PAH	Moisture Content	Grain Size	THE	Toxicity (b)	T O C	Asbestos	Chloride (b)	p H	Total Sulfides	Ammonia	Atterberg Limits
12	San Tomas Aquino	10,650	11	3	3	3	0	3	3	3	3	3	3	2	3	3	2	3	3	3	3
13	Saratoga	3,550	4	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
14	Smith	20	1	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
15	Sunnyvale East	3,200	4	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
16	Sunnyvale West	900	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
17	El Camino Storm Drain	120	1	1	1	1	0	1	0	1	1	1	1	0	1	1	0	1	1	1	1
Guadalupe Watershed (Central Zone)																					
18	Canoas	4,800	5	2	2	2	0	2	0	2	2	2	2	0	2	2	0	2	2	2	2
19	Greystone	500	1	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
20	Guadalupe River	9,400	10	3	3	3	3	3	3	3	3	3	3	2	3	3	2	3	3	3	3
21	Ross	800	1	1	1	1	0	1	0	1	1	1	1	0	1	1	0	1	1	1	1
22	Guadalupe	150	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1
23	Randol	300	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1
Coyote Watershed (East Zone)																					

Table 3B
Multi-Year Sediment Removal Sites
Summary of Analysis Performed at Each Site
(Average Annual Discrete Sediment Sampling)
(Continued)

Site No.	Sediment Removal Sites	Average Annual Estimated Volume Per Creek (CY)	Average Annual Number of Samples	Average Annual Number of Composites	Average Annual Number of Samples Tested for Individual Analytes																
					Total Metals	Metals WET	Mercury	Pesticides	Organo (a) Comp.	PAH	Moisture Content	Grain Size	THE	Toxicity (b)	TOC	Asbestos	Chloride (b)	pH	Total Sulfides	Ammonia	Atterberg Limits
24	Berryessa	9,750	10	3	3	3	0	3	3	3	3	3	3	1	3	3	1	3	3	3	3
25	Calera	900	1	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
26	Fisher	100	1	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
27	Los Coches	300	1	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
28	Lower Silver	4,480	5	2	2	2	0	2	2	2	2	2	2	0	2	2	0	2	2	2	2
29	Miguelita	450	1	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
30	Upper Penitencia	120	1	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
31	Lower Penitencia	5,000	5	2	2	2	0	0	2	2	2	2	2	1	2	2	1	2	2	2	2
32	Sierra	750	1	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
33	Upper Silver	200	1	1	1	1	0	1	0	1	1	1	1	0	1	1	0	1	1	1	1
34	Tularcitos	700	1	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
35	Norwood	360	1	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
36	Thomson	100	1	1	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
	TOTAL	**73,070**	**93**	**46**	**46**	**46**	**5**	**46**	**38**	**46**	**46**	**46**	**46**	**10**	**46**	**46**	**10**	**46**	**46**	**46**	**46**

Table 3C
Multi-Year Sediment Removal Sites
Summary of Analysis Performed at Each Site [(a)]
(Annual Average Residual Sediment Sampling)

Site No.	Sediment Removal Sites	Annual Average Estimated Volume Per Creek (CY)	Average Annual Total Number of Samples	Average Annual Number of Samples Tested for Individual Analytes	
				Total[(b)] Mercury	PCB[(b)]
Lower Peninsula Watershed (Northwest Zone)					
1	Adobe	2,480	0	0	0
2	Baron Debris Basin	500	1	1	1
3	Matadero	1,560	1	1	1
4	Permanente Diversion	200	0	0	0
5	Permanente	700	1	1	1
6	San Francisquito	1,350	1	1	1
7	Stevens	7,000	2	2	2
West Valley Watershed (North Central Zone)					
8	Calabazas	1,300	1	1	1
9	Junipero Serra Channel	100	1	1	1
10	Regnart	100	1	1	1
11	Rodeo	180	0	0	0
12	San Tomas Aquino	10,650	3	3	3
13	Saratoga	3,550	1	1	1
14	Smith	20	1	1	1
15	Sunnyvale East	3,200	1	1	1
16	Sunnyvale West	900	1	1	1
17	El Camino Storm Drain	120	0	0	0

Table 3C

Multi-Year Sediment Removal Sites
Summary of Analysis Performed at Each Site [(a)]
(Annual Average Residual Sediment Sampling)
(Continued)

Site No.	Sediment Removal Sites	Annual Average Estimated Volume Per Creek (CY)	Average Annual Total Number of Samples	Average Annual Number of Samples Tested for Individual Analytes	
				Total[(b)] Mercury	PCB[(b)]
Guadalupe Watershed (Central Zone)					
18	Canoas	4,800	0	0	0
19	Greystone	500	1	1	1
20	Guadalupe River	9,400	3	3	3
21	Ross	800	0	0	0
22	Guadalupe	150	1	1	1
23	Randol	300	1	1	1
Coyote Watershed (East Zone)					
24	Berryessa	9,750	3	3	3
25	Calera	900	1	1	1
26	Fisher	100	1	1	1
27	Los Coches	300	1	1	1
28	Lower Silver	4,480	2	2	2
29	Miguelita	450	1	1	1
30	Upper Penitenica	120	1	1	1
31	Lower Penitencia	5, 000	2	2	2
32	Sierra	750	1	1	1

Table 3C

Multi-Year Sediment Removal Sites
Summary of Analysis Performed at Each Site [a]
(Annual Average Residual Sediment Sampling)
(Continued)

Site No.	Sediment Removal Sites	Annual Average Estimated Volume Per Creek (CY)	Average Annual Total Number of Samples	Average Annual Number of Samples Tested for Individual Analytes	
				Total[b] Mercury	PCB[b]
33	Upper Silver	200	0	0	0
34	Tularcitos	700	1	1	1
35	Norwood	360	1	1	1
36	Thompson	100	1	1	1
	TOTAL	**73,070**	**38**	**38**	**38**

Table 3D

Multi-Year Sediment Removal Sites
Summary of Analysis Performed at Each Site
(Average Annual Herbicide Sampling)

Site No.	Sediment Removal Sites	Average Annual Estimated Volume Per Creek (CY)	Average AnnualTotal Number of Samples	Average Annual Number of Samples Tested for Individual Analytes					
				Roundup	Rodeo	Pendulum	Gallery	Surflan	Telar
Lower Peninsula Watershed (Northwest Zone)									
1	Adobe	2,480	TBD	TBD	TBD	TBD	TBD	TBD	TBD
2	Baron Debris Basin	500	TBD	TBD	TBD	TBD	TBD	TBD	TBD
3	Matadero	1,560	TBD	TBD	TBD	TBD	TBD	TBD	TBD
4	Permanente Diversion	200	TBD	TBD	TBD	TBD	TBD	TBD	TBD
5	Permanente	700	TBD	TBD	TBD	TBD	TBD	TBD	TBD
6	San Francisquito	1,350	TBD	TBD	TBD	TBD	TBD	TBD	TBD
7	Stevens	7,000	TBD	TBD	TBD	TBD	TBD	TBD	TBD
West Valley Watershed (North Central Zone)									
8	Calabazas	1,300	TBD	TBD	TBD	TBD	TBD	TBD	TBD
9	Junipero Serra Channel	100	TBD	TBD	TBD	TBD	TBD	TBD	TBD
10	Regnart	100	TBD	TBD	TBD	TBD	TBD	TBD	TBD
11	Rodeo	100	TBD	TBD	TBD	TBD	TBD	TBD	TBD
12	San Tomas Aquino	10,650	TBD	TBD	TBD	TBD	TBD	TBD	TBD
13	Saratoga	3,550	TBD	TBD	TBD	TBD	TBD	TBD	TBD
14	Smith	20	TBD	TBD	TBD	TBD	TBD	TBD	TBD

Table 3D
Multi-Year Sediment Removal Sites
Summary of Analysis Performed at Each Site
(Average Annual Herbicide Sampling)

Site No.	Sediment Removal Sites	Average Annual Estimated Volume Per Creek (CY)	Average AnnualTotal Number of Samples	Average Annual Number of Samples Tested for Individual Analytes					
				Roundup	Rodeo	Pendulum	Gallery	Surflan	Telar
15	Sunnyvale East	3,200	TBD	TBD	TBD	TBD	TBD	TBD	TBD
16	Sunnyvale West	900	TBD	TBD	TBD	TBD	TBD	TBD	TBD
17	El Camino Storm Drain	120	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Guadalupe Watershed (Central Zone)									
18	Canoas	4,800	TBD	TBD	TBD	TBD	TBD	TBD	TBD
19	Greystone	500	TBD	TBD	TBD	TBD	TBD	TBD	TBD
20	Guadalupe River	9,400	TBD	TBD	TBD	TBD	TBD	TBD	TBD
21	Ross	800	TBD	TBD	TBD	TBD	TBD	TBD	TBD
22	Guadalupe	150	TBD	TBD	TBD	TBD	TBD	TBD	TBD
23	Randol	300	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Coyote Watershed (East Zone)									
24	Berryessa	9,750	TBD	TBD	TBD	TBD	TBD	TBD	TBD
25	Calera	900	TBD	TBD	TBD	TBD	TBD	TBD	TBD
26	Fisher	100	TBD	TBD	TBD	TBD	TBD	TBD	TBD
27	Los Coches	300	TBD	TBD	TBD	TBD	TBD	TBD	TBD
28	Lower Silver	4,480	TBD	TBD	TBD	TBD	TBD	TBD	TBD

Table 3D

Multi-Year Sediment Removal Sites
Summary of Analysis Performed at Each Site
(Average Annual Herbicide Sampling)

Site No.	Sediment Removal Sites	Average Annual Estimated Volume Per Creek (CY)	Average AnnualTotal Number of Samples	Average Annual Number of Samples Tested for Individual Analytes					
				Roundup	Rodeo	Pendulum	Gallery	Surflan	Telar
29	Miguelita	450	TBD	TBD	TBD	TBD	TBD	TBD	TBD
30	Upper Penitenica	120	TBD	TBD	TBD	TBD	TBD	TBD	TBD
31	Lower Penitencia	5, 000	TBD	TBD	TBD	TBD	TBD	TBD	TBD
32	Sierra	750	TBD	TBD	TBD	TBD	TBD	TBD	TBD
33	Upper Silver	200	TBD	TBD	TBD	TBD	TBD	TBD	TBD
34	Tularcitos	700	TBD	TBD	TBD	TBD	TBD	TBD	TBD
35	Norwood	360	TBD	TBD	TBD	TBD	TBD	TBD	TBD
36	Thompson	100	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	TOTAL	**73,070**							

No.	Sites	Volume Per Creek (CY)	Number of Samples	Roundup	Rodeo	Pendulum

Table 4
Multi-Year Sediment Removal Program
Analytical Test Methods

Analyte	Test Method
Total CAM 17 Metals—100 percent of samples	EPA 6010 and 7000 series
Soluble CAM 17 Metals—100 percent of samples	EPA 6010 and 7000 series (Standard WET)
Total Mercury—100 percent of samples from Guadalupe, Los Gatos, Alamitos, and Coyote Creeks	EPA 7471, or equivalent
Methyl-mercury—100 percent of samples from Guadalupe, Los Gatos, Alamitos, and Coyote Creeks	EPA 1630 Modified
Pesticides—100 percent of samples	EPA 8081
Organophosphorous Compounds—100 percent of samples from earthen channels only	EPA 8141
Herbicide Compounds—Ten sites where applied, with largest sediment removal volume Roundup Rodeo Pendulum	 EPA Method 547s modified EPA Method 547s modified EPA Method 8141 modified
Herbicide Compounds—Three sites where applied, with largest sediment removal volume Gallery Surflan Telar	 Method CDFA modified EPA Method 632 modified EPA Method 632 modified
PAH—100 percent of samples	EPA 8310
Moisture Content—100 percent of samples	EPA 160.3
Grain Size Analysis—100 percent of samples	American Society for Testing and Materials (ASTM) D422 Sieve and Hydrometer (if over 10 percent fines)
Total Extractable Hydrocarbons—Kerosene/Diesel	EPA 8015 Modified
Toxicity Screening—Tidal site samples	U.S. Army Corps of Engineers Inland Testing Manual, February 1998 (percent survival—Eohaustorius estaurius)
Total Organic Carbon—100 percent of samples	EPA 415.2 or equivalent

Table 4

Multi-Year Sediment Removal Program

Analytical Test Methods

(Continued)

Analyte	Test Method
Asbestos—100 percent of samples	PLM
Chloride—On all samples from tidal areas	EPA 300.0 or equivalent
pH—100 percent of samples	EPA 150.1 or equivalent
Atterberg Limits—100 percent of samples	ASTM D4318
PCB - On all residual sediment samples in earthen channels	EPA 8082
Total Mercury-On all residual sediment samples in earthen channels	EPA 7471, or equivalent

Moisture Content

Sediments in creeks naturally contain moisture; moisture content may fluctuate during the year and is dependant on creek flows, groundwater elevation, and other local conditions. The moisture content of in-situ soils will be higher than the moisture content of excavated sediments, due to the natural process of evaporation and infiltration.

Analysis of moisture content is required for Class III landfill acceptance for wet soils. In addition, it is necessary to measure the moisture content in order to determine the dry weight concentrations of constituents within the sediment.

Selected Test Method and Frequency of Testing

All samples except residual sediment samples shall be analyzed for moisture content by EPA Method 160.3

Total Organic Carbon

Organic matter occurs naturally in sediment due to the plant and animal life. Organic matter may also be deposited in the creek by nonpoint source runoff.

The percentage of organic matter in the sediment is of concern because soils with high levels of organic content may be considered putrescent. The levels of organic content are also important if the sediments are to be used as a soil amendment or as structural fill.

Selected Test Method and Frequency of Testing

All samples except residual sediment samples shall be analyzed for TOC by EPA Method 415.2.

Salinity

Sediments in tidal areas may contain elevated levels of salinity. Salinity is of concern because it may be toxic to freshwater aquatic life. Class III landfills may also have restrictions on salinity levels.

Representatives from a local Class III landfill recommended that saline sediments be tested for chloride in order to receive landfill acceptance.

Selected Test Method and Frequency of Testing

All samples in tidal areas only except residual sediment samples shall be sampled for chloride by EPA Method 300.0.

Physical Parameters

The physical parameters of the sediments must be known to determine if a sediment is suitable for reuse as a construction material, or as a topsoil or soil amendment. Physical parameters of concern include grain size distribution and Atterberg Limits (liquid limit and plastic limit).

Grain size distribution is measured using both sieves and a hydrometer; sieves classify the coarse-grained fraction (sand and gravel), while a hydrometer classifies the fine-grained fraction (clays and silts). The sieve test can be used to determine the distribution of the coarse-grained materials, but not the distribution of the fines. Sediments with significant quantities of fines (greater than 10 percent passing a No. 200 sieve), should be analyzed by the hydrometer method to determine the distribution of the fines. Sediments with few fines (less than 10 percent passing No. 200 sieve) do not require hydrometer analysis; because the percentage of fines is so small.

The Atterberg Limits are used to determine the engineering properties of fine-grained soils passing a No. 40 sieve (clays, silts, and fine sands). ASTM Test Method 4318 for Atterberg Limits describes different test preparation methods, including Method A (wet preparation method) and Method B (dry preparation method). Method A is more accurate than Method B; however, Method A is also more costly. Mr. David Cooper, owner of Cooper Testing Labs, an independent geotechnical laboratory in Mountain View, California, has performed both Method A and Method B and has stated that the difference in accuracy is minimal.

District engineers recommend that soils be tested for grain size distribution and plasticity index. In addition, the representative of a local Class III landfill recommends that sediments used as engineered fill be tested for the plasticity index by the WET method.

Selected Test Methods and Frequency of Testing

All samples except residual sediment samples shall be tested for grain size distribution using sieves to determine the distribution of the course fraction by ASTM Method D422—sieve test.

Samples containing greater than 10 percent fines (as determined by the sieve test) shall be tested for grain size distribution using the hydrometer by ASTM D422—hydrometer.

All samples except residual sediment samples shall be tested for Atterberg Limits by ASTM Method D4318 and Method B (dry preparation).

Petroleum Products

Petroleum products may be present in the sediment due to nonpoint sources of pollution which are washed into the creek. Petroleum products which may have been deposited in the creek over time include heavier hydrocarbons (such as motor oil). Since the creek is a system which is open to the atmosphere, it is not likely that the sediments will contain volatile hydrocarbons.

Analytical test methods for petroleum products have been known to give misleading results, due to the fact that many standard test methods do not test specifically for petroleum products, but instead test for carbon chains found in the range of the petroleum product. Sediments and soils near a creek contain a lot of vegetation, and the carbon chains in decomposing vegetation are often the same length as petroleum product carbon chains. Historically, this has resulted in many false "positive tests" for diesel and other petroleum products. Because of the high rate of "false positives," petroleum testing should be analyzed by a gas chromatography method, and the results should always be compared to chromatograph standards for petroleum products. If results do not match standard chromatographs for petroleum products, the samples may not contain petroleum.

All samples will be analyzed for heavier hydrocarbons for total extractable hydrocarbons (THE-Kerosene, Diesel)) by California LUFT Modified 8015 method.

Selected Test Methods and Frequency of Testing

All samples except residual sediment samples shall be analyzed for total extractable petroleum hydrocarbons, for petroleum in the range of C8 through C28, by California LUFT Modified 8015 method (THE-Kerosene, Diesel).

Toxicity

Creek sediments may be toxic due to nonpoint source pollutants which may have been deposited into the creeks. Toxicity is of concern if the sediment is to be reused. Sediment toxicity test will be conducted only on composite samples from sites where the waters may not be controlled during sediment removal operations due to tidal action.

Selected Test Method and Frequency of Testing

All samples in tidal areas only except residual sediment samples shall be tested for toxicity by means of a toxicity screening bioassay, by the test method specified in California Code of Regulations, Title 22. The samples will be tested using Eohaustorius estuarius species.

pH

The pH of sediments is of concern for sediment reuse. Extremely high or low pH may indicate contamination. In addition, pH is useful for determining the suitability of the soil for reuse as a topsoil or soil amendment.

Selected Test Method and Frequency of Testing

All samples except residual sediment samples shall be tested for pH by EPA Method 150.1.

Asbestos

Asbestos may be present in sediments due to the presence of asbestos-containing serpentine rock formations within the Santa Clara Valley. Serpentine rock may have been used in the construction of levees constructed by landowners; therefore, there is a possibility that asbestos may be present in sites where there are no serpentine formations.

Selected Test Method and Frequency of Testing

All samples except residual sediment samples shall be analyzed by EPA Method 600R-93-116 (phase light microscopy).

Quality Control Samples

The following QA sampling and analyses shall be conducted:

Field Duplicates

Duplicate samples shall be collected at a rate of 10 percent of all analysis. Duplicate samples shall be analyzed for chemical parameters. No duplicate sampling shall be conducted for physical parameters.

Duplicates shall be submitted blind to the laboratory. Duplicate samples shall be equally distributed over the Sediment Removal Project sites and shall be collected at regular intervals.

Sampling precision is dependant upon both the sampling technique and the naturally-occurring small-scale heterogeneity in the media being sampled. Soil is a heterogeneous media and it is natural to encounter variations in the duplicate samples. Lack of precision in duplicate samples may indicate that either there is a problem in the sampling and analysis techniques, or it may indicate that the soil is very heterogeneous.

Laboratory Quality Control Samples

The laboratory shall perform matrix spike and lab duplicate analysis on samples at a rate of one per 20 samples. Laboratory QC samples shall be conducted for chemical parameters. No laboratory QC samples shall be conducted for physical parameters.

Detection Limits

Actual detection limits will be reported in the final report summary along with the results of the QA/QC samples, field and laboratory duplicates and blanks, matrix spike blanks, and matrix spike duplicates. A copy of the detection (reporting) limits on all analytical services, provided by the state-certified laboratory under contract with the District, are provided in Appendix E.

Turnaround Time

The standard laboratory turnaround time utilized shall be 2 weeks. Expedited 3-day turnaround time will be used for some samples to ensure that the Sediment Removal Project is completed in the summer of this year.

Laboratory

A laboratory certified by the State of California Department of Health Services under the Environmental Laboratory Accreditation Program for the analysis of drinking water, wastewater, and hazardous waste will be used as the primary laboratory for this project.

REPORTING

Upon receipt of the analytical results from the laboratory, the District shall compile the analytical results into a single report. The purpose of the report shall be to summarize the data in a form that is easy to comprehend. The purpose of the report is not to interpret the data nor is it to determine if the data provides a statistically representative characterization of the sediments. The analytical results report will be available for review by applicable regulatory agencies before the start of sediment removal operations.

SCREENING

In accordance with the WDR, the sediment will be disposed of "at a permitted landfill or otherwise at a site approved by the Executive Officer of the Regional Board."

It is anticipated that the sediment will be disposed of or reused at a permitted landfill and/or reused as construction fill.

In order for the sediment to be accepted at a permitted landfill, the sediment must meet the acceptance criteria of the individual landfill.

In order for the sediment to be reused as construction fill, the site must be approved by the Executive Officer of the Regional Board.

APPENDIX A
Random Number Generator Tables

Appendices Not Available Electronically

Random Number Generator Table

Read numbers from top to bottom of each column, from left to right.

Depth of Sediment = 0-1			Depth of Sediment = 0-2			Depth of Sediment = 0-3			Depth of Sediment = 0-4		
0	1	0	0	1	1	1	2	3	0	2	4
1	1	1	0	0	1	2	1	3	3	2	3
1	0	1	1	1	1	0	1	3	2	1	0
0	0	0	2	1	1	2	1	3	2	1	3
0	1	1	1	2	2	0	0	1	0	0	1
1	0	1	2	1	1	1	1	0	1	2	0
0	1	1	1	2	0	2	1	1	0	1	3
1	1	1	0	0	1	2	2	3	3	3	1
0	0	1	1	1	1	3	2	3	2	3	3
0	0	1	1	0	2	1	2	3	4	4	3
1	1	1	1	0	1	2	2	0	2	4	1
1	1	1	1	2	1	0	0	2	0	4	3
0	1	1	1	1	2	1	1	2	1	3	1
1	0	1	1	1	1	2	1	1	0	3	3
0	0	0	1	1	1	1	0	1	3	3	1
1	1	0	1	0	0	1	1	3	2	1	3
0	0	1	2	1	1	1	3	1	0	4	2
0	0	1	1	2	0	2	1	1	2	3	3
1	0	1	0	2	1	0	2	0	2	1	4
1	0	1	1	1	1	2	1	3	2	4	1
0	1	1	0	2	0	0	1	0	4	2	3
1	0	1	1	1	1	1	2	3	3	1	3
1	0	1	2	2	2	2	1	1	1	2	1
0	0	0	1	1	1	2	2	0	0	1	2
0	0	1	1	1	1	2	1	1	1	3	3
1	0	0	1	0	2	3	2	3	1	4	1
1	0	0	0	0	2	1	1	0	4	3	2
0	0	1	0	1	0	1	1	0	2	3	3
1	1	0	1	1	1	3	3	0	2	1	3
0	1	1	2	1	1	3	1	2	2	2	3
1	0	0	1	2	1	2	1	2	0	4	3
1	0	0	1	1	1	3	2	1	2	1	3
0	1	1	1	0	0	2	1	0	1	3	0
0	1	1	1	1	1	2	1	3	3	2	4
1	0	1	0	0	1	2	1	1	2	3	0
0	0	1	1	1	1	1	1	2	2	2	2

Use random numbers to determine the depth below ground surface (bgs) at which each sample shall be collected.

For example:

If the estimated depth of the sediment is 2 feet, select a random number from the table "Depth of Sediment = 0-2".
If # = 0, collect sample at 0 ft bgs.
If # = 1, collect sample at 1 ft bgs.
If # = 2, collect sample at 2 ft bgs.

APPENDIX B
Selection of Sampling Locations—Sample Exercise

Appendices Not Available Electronically

APPENDIX C
Chain of Custody Form

Appendices Not Available Electronically

SELECTION OF SAMPLING LOCATIONS:

This sample problem illustrates how sediment sampling locations are selected for a given reach.

GIVEN:

Reach Length = 0.7 mi (3,696 ft.)

Volume of Silt to be Removed = 3,750 yd^3

Number of Samples Collected = 3.75 = 4 (3,750 yd^3/1,000 yd^3 = samples)

Channel Width @ Invert = 22 ft

Sediment Depth = Varies: 1 ft – 3 ft

FIND:

Sampling Locations

SOLUTION:

Following the procedure, each sample (numbers 1-6) must be located by the station, the cross section and the depth.

STATIONS

1. Find Interval between samples

$$\frac{\text{Reach Length}}{\text{Number of Samples}} = \text{Interval}$$

$$\frac{3{,}696 \text{ ft}}{4 \text{ samples}} = 924 = 920 \text{ ft}$$

A sample shall be collected every 920 feet.

2. Find first sample location

Use a computer to generate a random number between 0 and 920.

For example: random number = 256

3. Calculate each sampling location

Sample #	Distance from Upstream or Downstream End of Creek Reach (ft)
1	256 (Random Number)
2	1176 (256 + 920)
3	2096 (256 + [2][920])
4	3016 (256 + [3][920])

CROSS SECTION

1. Use random number generator table to select numbers between 1 and 3.

   1 = Sample collected from left third

   2 = Sample collected from center third

   3 = Sample collected from right third

   Using the first four numbers on the table

   Sample 1 = 3 (right third)

   Sample 2 = 2 (center third)

   Sample 3 = 3 (right third)

   Sample 4 = 3 (right third)

2. Estimate the width of each "third"

   Channel Width = 22 ft

   22 ft/3 = 7.3 ft

DEPTH

1. Estimate sediment depth at each location using visual clues, notes, and probes.

Assume:

Sample	Depth of Sediment
1	3 ft
2	1 ft
3	1 ft
4	2 ft

2. Use appropriate random number generator table to select sample depth.

Sample No.	Depth of Sed	Sample Depth (using random numbers)
1	3	1
2	1	1
3	1	0
4	2	2

APPENDIX C
Chain of Custody Form

Appendices Not Available Electronically

anta Clara Valley Water District
750 Almaden Expressway
an Jose, CA 95118
hone: (408) 265-2600
AX: (408) 266-0271

CHAIN OF CUSTODY

FC 1019 (08-05-98

Project/Site Name:

Project Number:

Site Location:

Laboratory:

Sampled by (Print):

Requested By:

Sample ID#	Date Sampled	Time Sampled	Matrix	No. of Samples	Turn Around Time	Analyses Requested					REMARKS

ATRIX ABBREVIATION - Soil = S; Water = W; Product = P

Send FAX Results to:

District Approval:

Authorization No:

Relinquished By (Signatures)/Affiliation:	Please Print Name	Received By (Signatures)/Affiliation	Please Print Name	Date	Time

ribution: **ORIGINAL**–RETURN TO DISTRICT WITH RESULTS YELLOW–Laboratory PINK–District

APPENDIX D
Field Soil Sampling Log

Appendices Not Available Electronically

FIELD SOIL SAMPLING LOG
2001 SEDIMENT REMOVAL PROJECT

Date:	Time:
Name of Sample Collector:	
Sample ID Number:	Station Number:
Weather (circle): Fair Overcast Fog Sunny Temp: 33-54 55-79 >80	Creek Condition: Dry Flowing Sample Location: Dry Damp Underwater
Predetermined Sample Depth:	Actual Sample Depth:
Reason for Sample Depth Change:	
Sample Collection Method(s): ☐ Hand Auger ☐ Hand Trowel ☐ Other (specify):	Sample Container Type(s): ☐ Glass Jar ☐ Plastic Bottle (Rinse Blank) ☐ Other (specify):
Sample Collection Observations: Color: Odor:	General Sample Characteristics: ☐ Gravel ☐ Coarse Sand ☐ Medium Sand ☐ Fine Sand ☐ Silt/Clay
Comments:	
Signature of person filling out field log:	
Name of person filling out field log:	

APPENDIX E
Proposed Analytical Detection (Reporting) Limits

Appendices Not Available Electronically

Sequoia
Analytical

1551 Industrial Roa
San Carlos, CA 94070-411
(650) 232-960
FAX (650) 232-961
www.sequoialabs.co

April 4, 2001

Brett Calhoun
Santa Clara Valley Water District
Headquarters Building
5750 Almaden Expressway
San Jose, CA 95118-3686

RE: 2001 Sediment Removal Project

Dear Mr. Calhoun,

Please find attached a price quote and a list of analytical tests and detection limits in support of the District's 2001 Sediment Removal project. The reporting limits and compound lists remain approximately the same as the 2000 program. In response to your request for lower reporting limits, please note the following options:

Metals at 1 ppm
The most efficient and cost effective way to run the CAM 17 list of metals in soil is by ICP. **Our reporting limits range from 0.50 ppm to 7.0 ppm.** Reporting limit or Method Reporting Limit (MRL) is defined as the lowest level to be reliably detected within specified limits of precision and accuracy during routine laboratory operating conditions on environmental samples. To lower reporting limits below or close to 1 ppm we could estimate the potential detection by using a "J" qualifier. A "J" qualifier or flag is defined as an estimated detection of the compound of interest using the Method Detection Limit (MDL) as the minimum reporting limit. **Our MDLs range from .40 ppm to 6.9 ppm** An MDL is defined as the minimum concentration of an analyte that can be measured and reported with 99% confidence that the level is greater than zero. Please add $10.00 per sample. Another option would be to analyze by ICP/MS or GFAA. These methods do provide reporting limits below 1 ppm but, are not designed for large list of compounds. SCVWD can choose individual metals to supplement the CAM 17 ICP run. Please note additional charge per metal.

Mercury at 0.40 ppb
Sequoia Analytical can not achieve this reporting limit. **Our reporting limit is 4 ppb.** To lower reporting limits close to 0.40 ppb we could use a "J" estimated flag down to the MDL. **Our MDL is .20 ppb.** Please add $10.00 per sample.

PAHs at 1 ppb
Sequoia Analytical does not currently report soil PAHs to 1 ppb. Our lowest reporting limits can be achieved by EPA 8270 SIM. **The reporting limits range is from 5.0-10 ppb.** To lower reporting limits closer to 1 ppb we could use a "J" estimated flag down to the MDLs. **Our MDLs range from 0.72 ppb to 6.22 ppb.** Please add $10.00 per sample. Another more cost effective option would be to use EPA 8310. **The reporting limits are between 10 – 500 ppb. The MDLs range from 2.0 ppb to 23 ppb.** The cost difference is $95.00 per sample.

Organophosphorous Pesticides at 1 ppb
Sequoia Analytical can not achieve this reporting limit. **Our reporting limits range from 20 – 40 ppb.** To lower reporting limits close to 1 ppb we could use a "J" estimated flag down to the MDL. **The MDLs range from 3.0 ppb to 20 ppb.** Please add $10.00 per sample.

Please note that all reporting limits are based on a clean sample. If detections or matrix interferences are present, reporting limits may be raised to preserve the integrity of the results.

Sequoia Analytical looks forward to working with you on your environmental programs. If any question arise, please give me a call at 650 232-9600.

Sincerely,

Paul Henige
Business Development Manager

Sequoia
Analytical

1551 Industrial Roa
San Carlos, CA 94070-411
(650) 232-960
FAX (650) 232-961
www.sequoialabs.cor

PRICE PROPOSAL

Company: Santa Clara Water District
Contact: Mr. Brett Calhoun
Street: 5750 Almaden Expressway
City/State/Zip: San Jose, CA 95118-3686
Phone: 408 265-2607 ext 2653
Fax: 408 266-6251

Project Name: Sediment
By: Paul Henige
Date: 4/10/01
Proposal #: SCVWD041001
Start Date: Summer 2001
PO#: Standard Contract

Test Description	Matrix	Method	Unit Price	TAT (working days)	Qty.	Extension
CAM 17 Metals	Soil/AQ	EPA 6010	$ 115.00	10	1	$ 115.00
STLC CAM 17 Metals	Soil/AQ	EPA 6010	$ 160.00	10	1	$ 160.00
STLC Extraction Wet	Soil/AQ	Title 22	$ 45.00	10	1	$ 45.00
Individual element by ICP	Soil/AQ	EPA 6010	$ 10.00	10	1	$ 10.00
Individiual element by ICP/MS	Soil/AQ	EPA 6020	$ 15.00	10	1	$ 15.00
Individual element by GFAA	Soil/AQ	EPA 7000 series	$ 15.00	10	1	$ 15.00
Mercury	Soil/AQ	EPA 245.2 / 7471	$ 20.00	10	1	$ 20.00
Pesticides	Soil/AQ	EPA 8081	$ 75.00	10	1	$ 75.00
PCBs	Soil/AQ	EPA 8082	$ 50.00	10	1	$ 50.00
Organophosphorous Compounds	Soil/AQ	EPA 8141	$ 115.00	10	1	$ 115.00
PAHs	Soil/AQ	EPA 8270 SIM	$ 180.00	10	1	$ 180.00
PAHs	Soil/AQ	EPA 8310	$ 85.00	10	1	$ 85.00
Moisture Content	Soil/AQ	EP160.3	$ 10.00	10	1	$ 10.00
Grain Size Sieve & Hydrometer	Soil/AQ	ASTM-D422	$ 160.00	10	1	$ 160.00
TOC	Soil/AQ	EPA 415.1 Mod.	$ 30.00	10	1	$ 30.00
pH	Soil/AQ	EPA 150.1	$ 10.00	10	1	$ 10.00
Ammonia	Soil/AQ	EPA 350.1	$ 12.00	10	1	$ 12.00
Sulfide	Soil/AQ	EPA 9030B	$ 15.00	10	1	$ 15.00
Chloride	Soil/AQ	EPA 300.0	$ 12.00	10	1	$ 12.00
TEPH as Diesel and Kerosene	Soil/AQ	EPA 8015	$ 70.00	10	1	$ 70.00
% survival screen bioassay Fathead	Soil/AQ	Title 22	$ 200.00	10	1	$ 200.00
% survivial screen bioassay Stickleback	Soil/AQ	Title 22	$ 200.00	10	1	$ 200.00
% survivial screen bioassay Pillbug *	Soil/AQ	Title 22	$ 375.00	10	1	$ 375.00
Bioassay Pillbug *	Soil/AQ	Army Core	$ 800.00	10	1	$ 800.00
Asbestos *	Soil/AQ	PLM	$ 30.00	10	1	$ 30.00
Methyl Mercury *	Soil/AQ	EPA 1630 Mod.	$ 250.00	10	1	$ 250.00
Methyl Mercury *	Soil/AQ	EPA 1630 Mod.	$ 275.00	10	1	$ 275.00
Attenberg Limits*	Soil/AQ	ASTM-D4318	$ 140.00	10	1	$ 140.00
Composite charge per container	Soil/AQ	EPA Protocol	$ 5.00	10	1	$ 5.00
"J" flag to estimate reporting Lt.	Soil/AQ	EPA Protocol	$ 10.00	10	1	$ 10.00
				TOTAL:		$ 3,479.00

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Analytical

1551 Industrial Roa
San Carlos, CA 94070-411
(650) 232-9600
FAX (650) 232-961
www.sequoialabs.co

PRICE PROPOSAL

Company: Santa Clara Water District **Project Name:** Sediment

SURCHARGES:

In the event that rush turnaround time (TAT) is required, the following surcharges will apply:

7 days = 15%
5 days = 20%
3 days = 30%
2 days = 40%
1 day = 80%

* Subcontract Labs:
Asbestos - RJ LEE, Attenberg limits, Grain Size - ETS, Methyl Mercury - Brooks Rand, Pillbug - Pacific EcoRisk

PLEASE NOTE:

Please include proposal number on chain-of-custody to insure proper billing.
Unit prices include Sequoia Analytical Standard QA/QC, detection limits, parameters, and Terms and Conditions unless otherwise stated. Any significant deviation from the above quoted scope of work, including sample volumes, may result in a renegotiation of listed prices.

WE APPRECIATE THE OPPORTUNITY TO BE OF SERVICE TO YOU!!

Authorized Signature____

3/29/01

Sequoia Analytical - Morgan Hill

Analytical Method Information

Analyte	MDL	Reporting Limit	Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike / LCS %R	Blank Spike / LCS RPD
Hg Total 7470/7471 in Soil (EPA 7471A)								
Preservation: Store cool at 4°C								
Container: -		**Amount Required:** 100 grams			**Hold Time:** 28 days			
Mercury	0.000180	.00400 mg/kg			75 - 125	20	80 - 120	
Metals,CAMTTLCICP in Soil (EPA 6010A)								
Preservation: Store cool at 4°C								
Container: -		**Amount Required:** 100 grams			**Hold Time:** 180 days			
Antimony	2.00	2.00 mg/kg			80 - 120	20	80 - 120	20
Arsenic	4.00	4.00 mg/kg			80 - 120	20	80 - 120	20
Barium	1.50	5.00 mg/kg			80 - 120	20	80 - 120	20
Beryllium	0.500	0.500 mg/kg			80 - 120	20	80 - 120	20
Cadmium	0.600	0.600 mg/kg			80 - 120	20	80 - 120	20
Chromium	6.00	6.00 mg/kg			80 - 120	20	80 - 120	20
Cobalt	1.00	1.00 mg/kg			80 - 120	20	80 - 120	20
Copper	2.00	2.00 mg/kg			80 - 120	20	80 - 120	20
Lead	1.50	5.00 mg/kg			80 - 120	20	80 - 120	20
Molybdenum	1.00	1.00 mg/kg			80 - 120	20	80 - 120	20
Nickel	1.00	1.00 mg/kg			80 - 120	20	80 - 120	20
Selenium	5.00	5.00 mg/kg			80 - 120	20	80 - 120	20
Silver	1.50	1.50 mg/kg			80 - 120	20	80 - 120	20
Thallium	2.00	2.00 mg/kg			80 - 120	20	80 - 120	20
Vanadium	1.50	1.50 mg/kg			80 - 120	20	80 - 120	20
Zinc	7.00	7.00 mg/kg			80 - 120	20	80 - 120	20

Sequoia Analytical - Morgan Hill

3/29/01

Analytical Method Information

Analyte	MDL	Reporting Limit	Surrogate %R	Duplicate RPD	Matrix Spike		Blank Spike / LCS	
					%R	RPD	%R	RPD
Metals,CAMSTLCICP in Soil (EPA 6010A)								
Preservation: Store cool at 4°C								
Container: -		**Amount Required:** 100 grams			**Hold Time:** 28 days			
Antimony	0.0400	0.100 mg/l			80 - 120	20	80 - 120	20
Arsenic	0.0200	0.100 mg/l			80 - 120	20	80 - 120	20
Barium	0.000400	0.100 mg/l			80 - 120	20	80 - 120	20
Beryllium	0.000300	0.0100 mg/l			80 - 120	20	80 - 120	20
Cadmium	0.00100	0.0100 mg/l			80 - 120	20	80 - 120	20
Chromium	0.00300	0.0100 mg/l			80 - 120	20	80 - 120	20
Cobalt	0.00300	0.0400 mg/l			80 - 120	20	80 - 120	20
Copper	0.00300	0.0100 mg/l			80 - 120	20	80 - 120	20
Lead	0.0300	0.100 mg/l			80 - 120	20	80 - 120	20
Molybdenum	0.00800	0.0400 mg/l			80 - 120	20	80 - 120	20
Nickel	0.00400	0.0400 mg/l			80 - 120	20	80 - 120	20
Selenium	0.0500	0.100 mg/l			80 - 120	20	80 - 120	20
Silver	0.00300	0.0100 mg/l			80 - 120	20	80 - 120	20
Thallium	0.0400	0.100 mg/l			80 - 120	20	80 - 120	20
Vanadium	0.00400	0.0400 mg/l			80 - 120	20	80 - 120	20
Zinc	0.00200	0.0100 mg/l			80 - 120	20	80 - 120	20

Sequoia Analytical - Morgan Hill

Analytical Method Information

Analyte	MDL	Reporting Limit	Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike / LCS %R	Blank Spike / LCS RPD
Hg STLC CVAA in Soil (EPA 7470A)								
Preservation: Store cool at 4°C; Add HNO3 to pH<2 after extracti								
Container: Glass or Plastic		Amount Required: 250 grams			Hold Time: 28 days			
Mercury	0.000200	).000200 mg/l			75 - 125	20	80 - 120	

Sequoia Analytical - Morgan Hill

3/29/01

Analytical Method Information

Analyte	MDL	Reporting Limit	Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike / LCS %R	Blank Spike / LCS RPD
8081A Pesticides H in Soil (EPA 8081A)								
Preservation: *** DEFAULT PRESERVATION ***								
Container: -		**Amount Required:** 30			**Hold Time:** 14 days			
Aldrin	1.00	1.00 ug/kg			40 - 140	50	40 - 140	50
alpha-BHC	1.00	1.00 ug/kg						
beta-BHC	1.00	1.00 ug/kg						
delta-BHC	1.00	1.00 ug/kg						
gamma-BHC (Lindane)	1.00	1.00 ug/kg						
Chlordane (tech)	20.0	20.0 ug/kg						
4,4′-DDD	6.00	6.00 ug/kg						
4,4′-DDE	2.00	2.00 ug/kg						
4,4′-DDT	6.00	6.00 ug/kg						
Dieldrin	2.00	2.00 ug/kg			40 - 140	50	40 - 140	50
Endosulfan I	2.00	2.00 ug/kg						
Endosulfan II	2.00	2.00 ug/kg						
Endosulfan sulfate	6.00	6.00 ug/kg						
Endrin	2.00	2.00 ug/kg						
Endrin aldehyde	6.00	6.00 ug/kg						
Endrin ketone	6.00	6.00 ug/kg						
Heptachlor	1.00	1.00 ug/kg			40 - 140	50	40 - 140	50
Heptachlor epoxide	1.00	1.00 ug/kg						
Methoxychlor	20.0	20.0 ug/kg						
Toxaphene	80.0	80.0 ug/kg						
surr: Tetrachloro-m-xylene			30 - 150					
surr: Decachlorobiphenyl			30 - 150					

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3/29/01

Analytical Method Information

8082 PCB H in Soil (EPA 8082)

Preservation: *** DEFAULT PRESERVATION ***

Container: - Amount Required: 30 Hold Time: 14 days

Analyte	MDL	Reporting Limit	Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike / LCS %R	Blank Spike / LCS RPD
PCB-1016	20.0	20.0 ug/kg						
PCB-1221	80.0	80.0 ug/kg						
PCB-1232	20.0	20.0 ug/kg						
PCB-1242	20.0	20.0 ug/kg						
PCB-1248	20.0	20.0 ug/kg						
PCB-1254	20.0	20.0 ug/kg						
PCB-1260	20.0	20.0 ug/kg			40 - 140	50	40 - 140	50
surr: Tetrachloro-m-xylene			30 - 150					
surr: Decachlorobiphenyl			30 - 150					

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3/29/01

Analytical Method Information

8310 PAH by HPLC H in Soil (EPA 8310)

Preservation: Store in dark and cool at 4°C

Container: -

Amount Required: 250 grams

Hold Time: 14 days

Analyte	MDL	Reporting Limit	Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike / LCS %R	Blank Spike / LCS RPD
Naphthalene	14.8	100 ug/kg			30 - 150	50	30 - 150	50
Acenaphthylene	17.2	500 ug/kg						
Acenaphthene	22.5	100 ug/kg						
Fluorene	3.84	20.0 ug/kg						
Phenanthrene	1.53	10.0 ug/kg			30 - 150	50	30 - 150	50
Anthracene	2.15	10.0 ug/kg						
Fluoranthene	5.14	20.0 ug/kg						
Pyrene	4.06	10.0 ug/kg						
Benzo (a) anthracene	2.97	10.0 ug/kg						
Chrysene	2.06	10.0 ug/kg						
Benzo (b) fluoranthene	6.73	20.0 ug/kg						
Benzo (k) fluoranthene	3.86	10.0 ug/kg			30 - 150	50	30 - 150	50
Benzo (a) pyrene	8.31	10.0 ug/kg						
Dibenz (a,h) anthracene	8.42	20.0 ug/kg						
Benzo (ghi) perylene	5.08	20.0 ug/kg						
Indeno (1,2,3-cd) pyrene	2.54	20.0 ug/kg						
surr: 2-Fluorobiphenyl			30 - 150					

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3/29/01

Analytical Method Information

Analyte	MDL	Reporting Limit	Surrogate %R	Duplicate RPD	Matrix Spike		Blank Spike / LCS	
					%R	RPD	%R	RPD
8141A OPP H in Soil (EPA 8141A)								
Preservation: *** DEFAULT PRESERVATION ***								
Container: -		Amount Required: 1000			Hold Time: 14 days			
Azinphos methyl	5.22	40.0 ug/kg						
Bolstar	3.22	20.0 ug/kg						
Chlorpyrifos	5.34	20.0 ug/kg						
Coumaphos	4.56	40.0 ug/kg						
Demeton	3.28	20.0 ug/kg						
Diazinon	4.95	20.0 ug/kg			50 - 150	50	50 - 150	50
Dichlorvos	6.38	20.0 ug/kg						
Disulfoton	3.04	20.0 ug/kg			50 - 150	50	50 - 150	50
Ethion	9.70	20.0 ug/kg						
Ethoprop	5.35	20.0 ug/kg						
EPN	10.9	20.0 ug/kg						
Fensulfothion	9.93	20.0 ug/kg						
Fenthion	5.34	20.0 ug/kg						
Malathion	12.4	20.0 ug/kg						
Merphos	8.75	20.0 ug/kg						
Mevinphos	6.15	20.0 ug/kg						
Monocrotophos	20.0	40.0 ug/kg						
Naled	5.08	40.0 ug/kg						
Parathion-ethyl	14.8	20.0 ug/kg						
Parathion-methyl	4.60	20.0 ug/kg			50 - 150	50	50 - 150	50
Phorate	3.35	20.0 ug/kg						
Ronnel	5.69	20.0 ug/kg						
Stirophos	8.81	40.0 ug/kg						
Sulfotep	8.60	20.0 ug/kg						
Tokuthion (Prothiofos)	4.79	20.0 ug/kg						
Trichloronate	4.50	20.0 ug/kg						
surr: Triphenyl phosphate			50 - 150					

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3/29/01

Analytical Method Information

TPH-D/All in Soil (DHS LUFT)

Preservation: *** DEFAULT PRESERVATION ***

Container: - Amount Required: 100 G Hold Time: 14 days

Analyte	MDL	Reporting Limit	Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike / LCS %R	Blank Spike / LCS RPD
Diesel Range Hydrocarbons	1.00	1.00 mg/kg			50 - 150	50	60 - 140	50
Motor Oil (C16-C36)	10.0	10.0 mg/kg						
Crude Oil (C9-C40)								
Transformer Oil (C12-C30)								
Transmission Oil (C16-C36)								
Heating Oil (C9-C26)								
Hydraulic Oil (C16-C40)	10.0	10.0 mg/kg						
Mineral Spirits (C9-C13)								
JP-8 (C9-C18)								
Stoddard Solvent (C9-C13)	1.00	1.00 mg/kg						
Kerosene (C9-C18)	1.00	1.00 mg/kg						
JP-5 (C9-C17)								
JP-4 (C9-C15)								
Jet-A (C9-C17)	1.00	1.00 mg/kg						
Naphtha (C9-C13)	1.00	1.00 mg/kg						
Total Extractable Hydrocarbons	2.50	2.50 mg/kg						
Paint Thinner (C9-C13)								
surr: n-Pentacosane			50 - 150					
surr: o-Terphenyl			50 - 150					

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3/29/01

Analytical Method Information

Analyte	MDL	Reporting Limit	Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike / LCS %R	Blank Spike / LCS RPD
TOC 415.1 in Soil (SM 5310C)								
Preservation: Add H2SO4 to pH<2; Store cool at 4°C								
Container: -		Amount Required: 250 mls			Hold Time: 28 days			
Total Organic Carbon		50.0 mg/kg			75 - 125	20	80 - 120	20

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3/29/01

Analytical Method Information

Analyte	MDL	Reporting Limit	Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike / LCS %R	Blank Spike / LCS RPD
pH-9045C in Soil (EPA 9045C) **Preservation:** Store cool at 4°C **Container:** Glass or Plastic			**Amount Required:** 100 grams		**Hold Time:** 1 day			
pH				20				

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Analytical Method Information

Analyte	MDL	Reporting Limit	Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike / LCS %R	Blank Spike / LCS RPD
Chloride-300.0 WD in Soil (EPA 300.0) **Preservation:** Store cool at 4°C **Container:** Glass or Plastic		**Amount Required:** 100 grams			**Hold Time:** 28 days			
Chloride	0.00670	1.00 mg/kg			80 - 120	20	90 - 110	

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3/29/01

Analytical Method Information

Analyte	MDL	Reporting Limit	Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike / LCS %R	Blank Spike / LCS RPD
Percent Moisture in Soil (EPA 160.3) **Preservation:** Store cool at 4°C **Container:** 4 oz. jar		**Amount Required:** 100 grams				**Hold Time:** 7 days		
Moisture	0.100	0.100 %		20				

Sequoia
Analytical

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www.sequoialabs.com

April 30, 2001

Uday V. Mandlekar
Santa Clara Valley Water District
Headquarters Building
5750 Almaden Expressway
San Jose, CA 95118-3686

RE: Thallium reporting limit for 2001 sediment study

Dear Mr. Mandlekar,

Sequoia Analytical has confirmed that we can modify our standard reporting limit of 2.0 mg/kg to 1.8 mg/kg. This change will be made for samples submitted for the 2001 sediment study project.

Sequoia Analytical looks forward to working with you on this year's study. Please give me a call at 650 232-9600 if you need additional information.

Sincerely,

Paul Henige
Business Development Manager

Uday Mandlekar

From:	Paul Henige [phenige@sequoialabs.com]
Sent:	Friday, November 09, 2001 3:24 PM
To:	UdayMand@scvwd.dst.ca.us
Subject:	PCBs

Uday,

For your sediment project when you request PCBS we run EPA 8082. This is the most commonly requested method for PCBs. This method quantitates the PCBs by looking for the Aroclor patterns. The Arochlor patterns are made up of the PCB congeners. In total there are 209 congeners.
Each pattern has approximately 30 congeners in it.

The reporting limit is 20 ppb for 6 of the patterns.
PCB pattern 1221 will be reported at 80 ppb. It does not have as many congeners in it and they lacks sensitivity from the detector. It is our belief that the reporting limits will remain consistent for your project. If a sample is dirty , you do have the option to use a clean-up procedure called Gel Permeation Clean-up (GPC). This clean-up step does a good job in eliminating non target analytes allowing us to reach your desired reporting limit. There is an additional cost of $30.00 per sample to do this clean-up.

If you need an additional information please give me a call at 650 232-9600
Good luck,
Paul

Because access to receiving equipment is not under our control, Sequoia Analytical cannot be responsible for the confidentiality of electronically transmitted data unless prior arrangements have been made.

APPENDIX E:

SAN FRANCISCO BAY AREA REGION

SELF-MONITORING WATER QUALITY PROGRAM SAMPLING PLAN

SANTA CLARA VALLEY WATER DISTRICT

SELF-MONITORING PROGRAM WATER QUALITY SAMPLING PLAN (FINAL)

FOR THE

SAN FRANCISCO BAY AREA REGION
MULTI-YEAR STREAM MAINTENANCE PROGRAM

Prepared by

Kate Slama
Water Quality Specialist

Uday V. Mandlekar, Ph.D., R.E.A., P.E.
Senior Engineer

Under the Direction of

Beau Goldie, P.E., R.E.A.
Assistant Operating Officer
Office of Countywide Watershed Management

DECEMBER 2001

DISTRICT BOARD OF DIRECTORS

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Larry Wilson	**District 4**		

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INTRODUCTION

The Santa Clara Valley Water District (District) proposes to conduct sediment removal activities (dredging) on thirty-six (36) creeks over the next ten (10) years. The purpose of the program is to alleviate local flooding problems and to meet the requirements of the Federal Emergency Management Agency for flood protection. Under the Multi-Year Stream Maintenance Program, approximately 73,000 cubic yards (cy) of sediment will be removed annually.

As part of the verification and compliance monitoring (see subsection on VCM), field water quality parameters measured/observed by the District during sediment removal operations include pH, turbidity, dissolved oxygen, air temperature, precipitation, wind direction/velocity, tides, floating/suspended materials, color, and odor. The applicable water quality objectives included in the San Francisco Bay Region Basin Plan (the Basin Plan) for surface waters are: pH, salinity, sulfide, dissolved oxygen, turbidity, toxicity, ammonia, metals, temperature, taste and odor, suspended/settleable/floating material, oil and grease, sediment, population and community ecology, bioaccumulation, and bacteria. The sediment characterization effort conducted prior to the sediment removal operations, will test for most parameters identified by the Basin Plan. The sediment characterization data will be reviewed by the San Francisco Bay Regional Quality Control Board (Regional Board), the California State Department of Fish and Game (DFG), and the Santa Clara County Streams for Tomorrow to identify additional site-specific water quality tests described under the subsection on "Information and Data Collection Monitoring (IDM)."

According to the Basin Plan, the Regional Board establishes and enforces Waste Discharge Requirements (WDR) for point and nonpoint source of pollutants at levels necessary to meet numerical and narrative water quality objectives. The water quality tests performed by the District each year, as part of its stream maintenance program, were developed since 1997, based on the historic occurrence of pollutants within Santa Clara Valley streams, in accordance with the Basin Plan water quality objectives, and the Regional Board's WDR through a stakeholder process. The stakeholder process and lessons learned meetings involved participation of the Regional Board, the DFG, the U.S. Environmental Protection Agency (EPA), the U.S. Army Corps of Engineers (Corps), and various environmental organizations which assisted the District in continuous evaluation and improvement of the sediment characterization plan since 1997. A water quality monitoring report will be submitted to the Regional Board and other agencies/organizations after the completion of each year's sediment removal operations, in accordance with the Regional Board's WDR.

The water quality sampling plan proposed for the District's Multi-Year Stream Maintenance Program, as presented herein, is a result of the District's water quality sampling and evaluation effort, and continuous improvement process based on guidance from regulatory agencies and other stakeholders, since 1997.

PURPOSE

The purpose of the Self-Monitoring Program is twofold, namely:

- Verification and Compliance Monitoring (VCM)—To verify compliance with the effluent and receiving water limitations issued under the WDR by the Regional Board; and
- Information and Data Collection Monitoring (IDM)—To collect water quality data at selected sites that can be used to guide future projects, and the District's long-term permitting efforts. The sites will be recommended by the DFG, the Santa Clara County Streams for Tomorrow, and the Regional Board, based on their review of the 2001 sediment characterization data.

The Self-Monitoring Water Quality Sampling Plan includes procedures for recordkeeping and reporting purposes, to provide the documentation of compliance with effluent requirements, and prohibitions in the WDR. This includes field reporting forms, sample collection and laboratory analysis Quality Assurance/Quality Control (QA/QC) data reporting forms, and formal report to the Regional Board.

Verification and Compliance Monitoring (VCM)

The verification of compliance with applicable effluent limitations will be achieved by standard observations and field measurements, and by taking corrective actions as necessary during the sediment removal operations. The VCM will focus on the entire site operation, including installation and removal of the pollution control measures. Should any of the water quality limits specified in the WDR be exceeded at any time, project operations will cease and corrective measures will be taken in accordance with regulatory agency requirements to prevent future exceedances of these limits.

Information and Data Collection Monitoring (IDM)

As part of the IDM effort, water quality data necessary for the District's future projects and long-term permitting efforts will be collected. The samples will be analyzed by field measurement or by a laboratory certified by the EPA, and/or the State of California. Specific IDM monitoring requirements are identified in this plan as follows:

1. Monitoring of bladder dam deflation/removal BMP operations consistent with the 1997 Water Quality Monitoring Program to produce comparable data at a selected bladder dam site.

   A bladder dam site with longest operation of the dam will be selected for monitoring.

   a. Pre-BMP Bladder Dam Removal Sample—Collect one sample inside the bladder dam just prior to removal of BMP and analyze for temperature, pH, turbidity, and dissolved oxygen (field measurements) and send samples to a state certified laboratory for analyses of ammonia, dissolved sulfides, total settleable solids, and total suspended solids.

b. BMP Removal Samples—Collect samples every ½ hour at the location downstream of the bladder dam as close to the dam as safety allows but no more than 50 feet from the dam until the dam is removed, and analyze for turbidity.

2. Monitoring of any new turbidity control BMP consistent with the 1997, 1998, and 2000 Water Quality Monitoring Programs to produce comparable data at a selected site for each type of new BMP (e.g., wood panel site).

For each type of new BMP used (not utilized previously), a site with the longest duration of BMP operation will be selected for monitoring.

a. BMP Installation and Removal Samples—Collect samples every ½ hour at the location downstream of the BMP as close to the BMP as safety allows, but no more than 50 feet from the BMP until the BMP is removed, and analyze for turbidity.

Special study needs:

a. Monitor the quality of ponded water at a selected haybale-filter fabric dam by daily sampling for temperature, turbidity, pH, dissolved oxygen, dissolved sulfides, total settleable solids, total suspended solids, and ammonia measurements until the haybale-filter fabric dam is removed. The haybale-filter fabric dam site selected will be the one that potentially has the longest duration of operation.

Table 1
San Francisco Bay Area Region
Multi-Year Sediment Removal Sites

Creek	Location	Creek No.	Type	Freq (No. of times work to be done in 10 years)	From Sta	To Sta	Length (ft)	Estimated Total Length for 10 year Program (ft)	Avg Vol each time removed (cy)	Estimated Total Vol for 10 year Program (cy)	Ave. Vol./Yr. (cy)
Lower Peninsula Watershed (North West Zone)											
Adobe Creek	Hwy 101 to Lewis	1010	C	4	130+00	170+00	4,000	16,000	4,500	18,000	1,800
	Near El Camino		C	4	220+00	250+00	3,000	12,000	1,700	6,800	680
Baron Creek Debris Basin	Foothill to Miranda	1012	DB	1	159+00	162+00	300	300	5,000	5,000	500
Matadero Creek	Hwy 101 to Rosa	1021	EB,C	6	94+00	140+00	4,600	27,600	2,600	15,600	1,560
Permanente Diversion	Near Grant	1023	C	4	50+00	65+00	1,500	6,000	500	2,000	200
Permanente Creek	Hwy 101 to Charleston	1024	E	4	113+00	126+00	1,300	5,200	1,000	4,000	400
	d/s Portland		C	3	340+00	350+00	1,000	3,000	1,000	3,000	300
San Francisquito Creek	d/s Hwy 101	1029	E	3	70+00	80+00	1,000	3,000	4,500	13,500	1,350
Stevens Creek	Crit. To L'Avenida	1029	E	5	88+00	130+00	4,200	21,000	12,000	60,000	6,000
	near Moffet		C	5	150+00	165+00	1,500	7,500	2,000	10,000	1,000
West Valley Watershed (North Central Zone)											
Calabazas Creek	d/s Hwy 101	2010	E	3	82+00	102+00	2,000	6,000	3,000	9,000	900
	near Pomeroy		C	4	250+00	252+00	200	800	200	800	80
	near Georgetown		C	4	194+00	196+00	200	800	200	800	80
	Comer Debris Basin		DB	3	599+00	605+00	600	1,800	800	2,400	240
Junipero Serra Channel	to Blaney	2013	E	1	0000	60+00	6,000	6,000	1,000	1,000	100
Regnart Creek	near Kim	2017	E	5	80+00	85+00	500	2,500	200	1,000	100
Rodeo Creek	Dandridge	2018	C	3	3+00	4+50	150	450	500	1,500	150

C: Concrete
CB: Concrete Bottom
DB: Debris Basin
E: Earth
EC: Excavated Channel
LF: Low Flow

Table 1

San Francisco Bay Area Region
Multi-Year Sediment Removal Sites
(Continued)

Creek	Location	Creek No.	Type	Freq (No. of times work to be done in 10 years)	From Sta	To Sta	Length (ft)	Estimated Total Length for 10 year Program (ft)	Avg Vol each time removed (cy)	Estimated Total Vol for 10 year Program (cy)	Ave. Vol./Yr. (cy)
	Rainbow		C	3	12+00	13+00	100	300	50	150	15
	Dartmore		C	3	27+00	28+00	100	300	50	150	15
San Tomas Aquino Creek	d/s Monroe	2019	E,C	3	0000	225+00	22,500	67,500	30,000	90,000	9,000
	Westmont Debris Basin		DB	3	637+00	642+00	500	1,500	5,500	16,500	1,650
Saratoga Creek	to Warburton	2021	E	5	0000	34+00	3,400	17,000	6,000	30,000	3,000
	near Lawrence, Hwy 280		E	1	170+00	200+00	3,000	3,000	5,000	5,000	500
	Prospect		C	1	304+00	306+00	200	200	500	500	50
Smith Creek	to Elam	2023	C,E	1	0000	17+00	1,700	1,700	200	200	20
Sunnyvale East Channel	to Hwy 101	2026	E	4	0000	110+00	11,000	44,000	8,000	32,000	3,200
Sunnyvale West Channel	Carl to Hwy 101	2027	E	2	50+00	134+00	8,400	16,800	4,500	9,000	900
El Camino Storm Drain	to Monroe	2037	C	1	0000	52+00	5,200	5,200	1,200	1,200	120
Guadalupe Watershed (Central Zone)											
Canoas Creek	All	3011	CB	4	0000	390+00	39,000	156,000	12,000	48,000	4,800
Greystone Creek	to Almaden	3014	E	1	0000	21+00	2,100	2,100	5,000	5,000	500
Guadalupe River	d/s Montague	3015	EC	6	315+00	390+00	7,500	45,000	10,000	60,000	6,000
	d/s Trimble		E	3	390+00	450+00	6,000	18,000	8,000	24,000	2,400
	St. John St.		C	4	663+00	670+00	700	2,800	2,500	10,000	1,000

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Table 1

San Francisco Bay Area Region
Multi-Year Sediment Removal Sites

(Continued)

Creek	Location	Creek No.	Type	Freq (No. of times work to be done in 10 years)	From Sta	To Sta	Length (ft)	Estimated Total Length for 10 year Program (ft)	Avg Vol each time removed (cy)	Estimated Total Vol for 10 year Program (cy)	Ave. Vol./Yr. (cy)
Ross Creek	Cherry	3023	C	5	27+00	28+50	150	750	200	1,000	100
	Jarvis		C	5	43+00	44+00	100	500	200	1,000	100
	u/s Jarvis		C	5	47+00	50+00	300	1,500	200	1,000	100
	Meridian		C	5	71+00	72+00	100	500	200	1,000	100
	d/s Leigh		C	5	151+00	153+00	200	1,000	200	1,000	100
	d/s Union		C	5	178+00	181+00	300	1,500	200	1,000	100
	Los Gatos Almaden		C	5	204+00	205+00	100	500	200	1,000	100
	Almaden Valley Pipeline		C	5	222+00	223+25	125	625	200	1,000	100
Guadalupe Creek	at Camden Road	3026	E	3	1165+00	1170+00	500	1,500	500	1,500	150
Randol Creek	Rajkovitch to u/s Viewpoint	3029	E	1	45+00	80+00	3,500	3,500	3,000	3,000	300
Coyote Watershed (East Zone)											
Berryessa Creek	to Los Coches Creek	4017	E	5	0000	93+50	9,350	46,750	15,000	75,000	7,500
	Los Coches to Montague		E	3	93+50	165+00	7,150	21,450	3,500	10,500	1,050
	Cropley to Morrill		E	3	230+00	234+00	400	1,200	1,500	4,500	450
	d/s Piedmont		E	3	284+00	298+00	1,400	4,200	2,500	7,500	750
Calera Creek	to Drop Structure	4018	E	4	0000	31+00	3,100	12,400	1,500	6,000	600
	to Russell Lane		E	2	31+00	48+00	1,700	3,400	1,500	3,000	300
Fisher Creek	Leguna	4023	E	1	145+00	155+00	1,000	1,000	1,000	1,000	100
Los Coches Creek	to u/s Hwy 680	4025	E	3	0000	24+00	2,400	7,200	1,000	3,000	300

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Table 1

San Francisco Bay Area Region
Multi-Year Sediment Removal Sites
(Continued)

Creek	Location	Creek No.	Type	Freq (No. of times work to be done in 10 years)	From Sta	To Sta	Length (ft)	Estimated Total Length for 10 year Program (ft)	Avg Vol each time removed (cy)	Estimated Total Vol for 10 year Program (cy)	Ave. Vol./Yr. (cy)
Lower Silver Creek	d/s McKee	4026	E	5	38+00	52+00	1,400	7,000	1,500	7,500	750
	u/s Alum Rock		C	3	88+00	100+00	1,200	3,600	600	1,800	180
	Jackson to Capital		E	1	128+00	155+00	2,700	2,700	1,500	1,500	150
	u/s No. Babb		E	1	168+00	173+00	500	500	500	500	50
	d/s Martha Street		E	3	200+00	205+00	500	1,500	500	1,500	150
	Cunningham to Quimby		E	3	245+00	315+00	7,000	21,000	10,000	30,000	3,000
	King to Pipe		E	2	367+00	377+50	1,050	2,100	1,000	2,000	200
Miguelita Creek	Lochridge to Educational Park Drive	4029	E	3	10+00	25+00	1,500	4,500	1,000	3,000	300
	d/s Jackson to Jackson		E	3	37+00	44+00	700	2,100	500	1,500	150
Upper Penitencia Crk	King	4032	E	2	35+00	38+00	300	600	300	600	60
	Maybury		E	2	55+00	57+00	200	400	200	400	40
	near Maybury		E	2	71+00	72+00	100	200	100	200	20
Lower Penitencia Crk	to CA Circle	4033	E,C	8	0000	50+00	5,000	40,000	5,000	40,000	4,000
	Calavaras to d/s Hetch Hetchy		E,C	4	112+00	140+00	2,800	11,200	2,500	10,000	1,000
Sierra Creek	Berryessa to Mauna Kea	4037	E	3	0000	72+00	7,200	21,600	2,500	7,500	750
Upper Silver Creek	to Hwy 101	4038	C	2	0000	35+00	3,500	7,000	1,000	2,000	200

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San Francisco Bay Area Region
Multi-Year Sediment Removal Sites
(Continued)

Creek	Location	Creek No.	Type	Freq (No. of times work to be done in 10 years)	From Sta	To Sta	Length (ft)	Estimated Total Length for 10 year Program (ft)	Avg Vol each time removed (cy)	Estimated Total Vol for 10 year Program (cy)	Ave. Vol./Yr. (cy)
Tularcitos Creek	to Hwy 680	4040	E	2	0000	38+00	3,800	7,600	3,500	7,000	700
Norwood Creek	to White Road	4042	E	2	0000	32+00	3,200	6,400	1,800	3,600	360
Thompson Creek	u/s Quimby	4047	E	1	0000	20+00	2,000	2,000	1,000	1,000	100
TOTAL								**219,975**	**752,825**		73,070

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DEFINITION OF TERMS

Grab sample is defined as an individual sample collected in a short period of time not exceeding 15 minutes. They are to be used primarily in determining compliance with effluent and receiving water limits. Grab samples only represent the condition that exists at the time the water and effluent are collected.

One hundred feet from the point of discharge is defined as 100 feet downstream of the point at which water diverted around the dredging site is discharged into **nontidal** waters of the State.

Point of discharge is defined as the point at which water diverted around the dredging site is discharged into **tidal or non-tidal** waters of the State.

Active site is defined as that portion of a channel or stream on which dredging is being conducted and/or that may be subject to surface water flow during dredging within the project boundaries.

Duly authorized representative is one whose:

A. Authorization is made in writing by a principal executive officer, or

B. Authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity (e.g., field supervisor, project manager, chief engineer).

SPECIFICATIONS FOR SAMPLING AND ANALYSES

The District will perform sampling and analyses in accordance with the following conditions and requirements included in the WDR issued by the Regional Board:

Receiving Waters

1. Diverted water discharge sampling will be conducted at 100 feet downstream from the point of discharge at the nontidal sites during dredging. The first sampling event will be conducted on the first day of the project (e.g., during the installation of water diversion Best Management Practices [BMP]). At tidal sites, no receiving water sampling will be conducted, instead diverted water/work area outfall sampling will be conducted.

2. Prior to the start of work (e.g., prior to the installation of water diversion BMPs) at each active site, background water samples will be collected at a minimum of 100 feet upstream of the active site. The samples will be representative of typical undisturbed conditions and will not be taken during a rainstorm or subsequent runoff event. In addition, the District may collect background samples on a daily basis a minimum of 100 feet upstream of the active site. Background data generated by analysis of samples collected daily will be valid for discharge occurring on the same day. These samples will be immediately analyzed on site for the following constituents:

Constituents	Type of Sample	Units
Turbidity	Grab	NTUs
pH	Grab	Not Applicable
Dissolved Oxygen	Grab	mg/l

3. Receiving water samples will be collected at the active sites, at least two samples per day, evenly spaced during the work hours, with the first set of samples collected no earlier than 1 hour after work (e.g., dredging or installation of water diversion BMPs) has commenced each day. The location of each sampling site is 100 feet downstream from the point of diverted water discharge at the nontidal sites. At tidal sites, diverted water/work area outfall sampling will be conducted. These samples will be immediately analyzed on site for the following constituents:

Constituents	Type of Sample	Units
Turbidity	Grab	NTUs
pH	Grab	Not Applicable
Dissolved Oxygen	Grab	mg/l

4. Samples will be taken at least 1 foot below the surface of the water body when possible. Duplicate samples will be collected a minimum of once per week, with one set of samples analyzed on site and one set of samples sent to a laboratory for analysis of the same constituents analyzed for on site.

5. If the analytical results for constituents analyzed on site show that any grab sample exceeds any receiving water limit, confirmation samples will be taken within 2 hours and every subsequent 2 hours and analyzed for all constituents for which on-site analysis is required. Sampling at this higher frequency will continue until the exceedance has been corrected.

6. If any receiving water limit for a constituent or constituents is exceeded, then the District will implement the following process to address the exceedance:

   a. Immediately implement procedures to identify the source of the exceedance;

   b. Once the source of the exceedance has been identified, immediately implement procedures to correct the source of the exceedance; and

   c. Resample to determine whether the exceedance has been corrected.

7. If any receiving water limit for a constituent or constituents is exceeded for a 12-hour period, then the District will immediately notify the Regional Board by telephone and telefax of the exceedance and how the District is correcting or will correct the exceedance.

8. If any receiving water limit for a constituent or constituents is exceeded for a 24-hour period, then dredging will be terminated until the cause of the violation is found and sampling demonstrates that the exceedance has been corrected or when the District has provided the Regional Board with a corrective action plan, acceptable to the Executive Officer, that provides alternative methods of compliance.

9. For other violations, the District will notify the Regional Board immediately whenever violations are detected at which time dredging activity will be terminated and dredging activity will not resume until the District has provided the Regional Board with a corrective action plan, acceptable to the Executive Officer, that provides alternative methods of compliance.

10. The Regional Board recognizes that even with BMPs and appropriate equipment and methods, turbidity levels may momentarily exceed the limitations defined in the WDR during the initial stage of such activities as (a) culvert invert cleaning for panel placement; (b) streambed preparation for bladder dam placement; (c) initial flow discharge in constructed bypass channels; (d) removal of panels and bladder dams; (e) placement and removal of coffer dams; and (f) installation and removal of corrective action measures. The following describes specific activities and duration of exceedance allowances:

    According to the WDR issued by the Regional Board, at any given site, an exceedance of the turbidity limit during an activity described in 10(a) through 10(d) above, for a duration of not more than four (4) hours, will not be considered a "violation" in the context of enforcement or the need to take corrective action. The District will take all reasonable actions to limit the duration and magnitude of such exceedance events.

    According to the WDR issued by the Regional Board, at any given site, an exceedance of the turbidity limit during an activity described in 10(e) and 10(f) above will not be considered a "violation" in the context of enforcement or the need to take corrective action provided the duration of exceedance is:

Not More Than	For Channel Widths
4 hours	Less than 100 feet wide
6 hours	100 to 150 feet wide
8 hours	More than 150 feet wide

The District will take all reasonable actions to limit the duration and magnitude of such exceedance events.

Effluent

1. Effluent sampling will be conducted at any off-site temporary sediment stockpile location on every day that there is a discharge and results known within 24 hours of the sampling. Sampling will be conducted at all storm drains or other points of discharge. These samples will be analyzed for the following constituents:

Constituents	Type of Sample	Units
Turbidity	Grab	NTUs
pH	Grab	Not Applicable
Dissolved Oxygen	Grab	mg/l
Dissolved Sulfide	Grab	mg/l
Settleable Matter	Grab	ml/l/hr

2. If the analytical results for constituents analyzed show that any grab sample exceeds any effluent limit, confirmation samples will be collected within 24 hours and results known within 24 hours of the sampling.

3. If any effluent limit is exceeded in the confirmation sample(s), then a violation will have occurred and the discharge will be terminated until the cause of the violation is found and corrected. The District will immediately notify the Regional Board by telephone and telefax of the violation and how it is correcting or will correct the violation.

Data Collection Methods

Three types of data collection will be conducted at the sites: standard observations, water quality analyses using field instruments, and sample collection and transport to a certified laboratory for analysis. QA/QC methods for laboratory analyses are common to all sampling activities and are described in Section V.

Standard Observations

The following observations will be recorded on every day of operation on the field reporting form (Appendix A):

a. Receiving Water and Effluent

(1) Floating and suspended materials of waste origin (to include oil, grease, algae, and other macroscopic particulate matter): presence or absence, source, and size of affected area.

(2) Discoloration and turbidity: description of color, source, and size of affected area.

(3) Odor: presence or absence, characterization, source, distance of travel, and wind direction.

(4) Hydrographic condition including: time and height of corrected low and high tides and depth of water columns and sampling depths.

(5) Weather condition including: air temperatures, wind direction and velocity, and precipitation.

Field Instruments

Water quality measurements of pH, turbidity, temperature, and dissolved oxygen can be reliably conducted using field instruments. This is a common practice to obtain relatively instantaneous results which can be immediately confirmed and acted on should the results indicate water quality is being compromised by the project operations. Water quality limits for these items based on the WDR are summarized in Table 2. Confirmation of an exceedance will be determined in accordance with Section IV—Specifications for Sampling and Analyses for Receiving Waters. If an exceedance is confirmed, the Site Coordinator will be immediately notified. Standard methods for calibration and operation of the field instruments used for analysis of water quality for these items are referenced in Table 3. Complete descriptions of the procedures are included in Standard Methods for the Examination of Water and Wastewater, 19th edition (1995). The test results will be recorded on the field reporting forms (Appendix A).

Laboratory Analyses

Three water quality analyses cannot be conducted using field instrumentation. The determination of the concentrations of ammonia, dissolved sulfides, the concentration of Total Suspended Solids (tidal and nontidal sites), and the concentration of total settleable solids will be conducted by a laboratory certified by the EPA and/or the State of California on selected samples. The analytical methods to be used are referenced in Table 3.

Laboratory analyses for dissolved sulfides, total suspended solids, total settleable solids, and ammonia will be conducted on samples collected at the IDM sites for special study needs and as required by the WDR.

Water Quality Testing and Water Sample Collection

Temperature, dissolved oxygen, and pH data will be collected by direct immersion of the instrument probe into the water column. Wherever possible, the probes will collect data from 1 foot below the surface (tidal and nontidal sites). The procedure requires up to 15 minutes to perform and will be repeated twice to confirm the results.

The water samples will be collected from a depth of 1 foot below the water surface when possible. Samples will be collected at a distance of 100 feet downstream from the point of diverted water discharge at the nontidal sites, and diverted water/work area outfall samples will be collected at the tidal sites. Samples of the discharge from temporary storage sites (if utilized) are to be collected as near as possible to the point of discharge without compromising the safety of personnel.

Water samples will be collected at sites by holding the sample collection device below the surface and allowing it to fill only when it is at least 1 foot below the surface and at least 1 foot above the bottom of the waterway. If the water is less than 2 feet deep, the sample will be collected at mid-depth. The sample collection device will be rinsed three times in this manner. Subsequent water collected with the sample collection device will be decanted into two 1-liter volume glass containers (for Total Suspended Sediment analysis) and into two 100-milliliter (ml)-volume glass sample containers (for Ammonia analysis). Two sealed 100-ml volume glass sample containers will be immersed to the same sample depth as the sample collection device (for Dissolved Sulfide analysis). While immersed the two containers will be unsealed, allowed to fill, then sealed. These duplicate samples will then be placed in the transport container and sent to the laboratory. Two 100-ml volume glass sample containers will also be filled from the water collection device and used to determine turbidity using a field instrument.

Water samples will be collected at temporary storage sites (if utilized) by holding the sample collection device in the discharge and allowing it to fill. The sample collection device will be rinsed three times in this manner. Subsequent samples will be decanted into two 1-liter volume glass sample containers (for Total Suspended Sediment analysis) and into two 100-milliliter (ml) volume glass sample containers (for Ammonia analysis). Two sealed 100-ml volume glass sample containers will be immersed to the same sample depth as the sample collection device (for Dissolved Sulfide analysis). While immersed the two containers will be unsealed, allowed to fill, then sealed. These duplicate samples will then be placed in the transport container and sent to the laboratory.

Records to be Maintained

1. Written reports, strip charts, calibration and maintenance records, and other records shall be maintained by the discharger and accessible at all times. Records shall be kept for a minimum of 3 years. Records shall include notes and observations for each sample as follows:

    a. Identity of each sampling and observation station by number.

    b. Date and time of sampling.

    c. Date and time analyses are started and completed and the name of person conducting analyses.

    d. Complete procedure used, including the method of preserving and analyzing the sample and identity and volumes of reagents used. A reference to a specific section of Standard Methods is satisfactory.

    e. Calculations of results.

    f. Results of analyses and/or observations.

2. Records shall include a map or maps of the site showing the location of sediment and water sampling locations, coffer dams, discharge pipes, access ramps, etc.

3. A tabulation shall be maintained showing the following:

    a. Diverted flow data for the reach to be desilted, including estimated total flow or volume on a daily basis and maximum and minimum flows for each month, if applicable.

    b. Receiving water sampling data for each sampling location.

QUALITY ASSURANCE AND QUALITY CONTROL

A QA/QC plan is an important component of a monitoring program involving extensive field sampling and laboratory analyses. This section describes the major elements of the QA/QC plan.

The two objectives of the QA/QC plan are: (1) to provide a means of ongoing control and evaluation of the sampling and analysis procedures; and (2) to quantify data precision and accuracy for use in data interpretation. QA/QC will be followed in all phases of the monitoring program including sampling, laboratory analysis, and data validation and reporting.

Field Sampling and Field Instrument Quality Assurance and Quality Control

District will utilize a sampling contractor to use the field instruments and sampling equipment and will be responsible for managing all field sampling and analysis. All equipment will be tested and calibrated before leaving the office and verified upon arrival at the site to ensure the instruments are in proper working condition. Potential laboratory or field contamination will be assessed using "blind" equipment blanks and duplicate samples. Duplicate sampling will be conducted every time a sample is collected. Sampling equipment blank samples will be analyzed at least once per site. Additional blank samples will be analyzed as the need arises. Equipment blank samples will be obtained using deionized water rinses of all sampling equipment and containers mixed into a single sample to be sent to the laboratory for analysis.

Sample Custody Procedures

All sample custody and transfer procedures are based on EPA-recommended procedures (Codes of Federal Regulations 40, Section 136) and emphasize careful documentation of sample collection and handling processes. Precise instructions for chain of custody and documentation procedures for all sampling activities are described in Appendix B. Pre-formatted sample custody forms (Appendix A) will be used to document the relevant information for each sample bottle and the transfer of the bottles to the laboratory, under specified conditions (see Table 3).

Laboratory Procedure Quality Assurance and Quality Control

The laboratory analyses to be performed on water samples collected from the sites are itemized in Table 3. In addition to performing the analyses, the laboratory must make every effort to meet the target detection limits for each analytical method. Other QA/QC objectives that the laboratory must meet include sample holding times and sample preservation techniques listed in Table 3. The laboratory will also be required to meet precision and accuracy objectives discussed below.

Laboratory precision will be assessed by the analysis of laboratory duplicates. Combined field and laboratory precision will be evaluated by the field duplicate sample analyses.

Sample contamination resulting from laboratory analysis procedures or sample storage methods will be assessed by the analysis of laboratory blanks and laboratory equipment blanks. Analyses of these blanks will be reported for each day samples are analyzed.

All reported analytical results will be evaluated against the requested analyses to evaluate the completeness of the analytical characterization of the water samples. Overall data quality will be assessed based on sampling and analytical conditions, adherence to internal QA/QC procedures, and results of accuracy and precision checks. Actual detection limits will be reported in the final report summary along with the results of field duplicates and laboratory duplicates and blanks.

SAMPLE COLLECTION FREQUENCY

Prior to initiation of project operations (e.g., prior to the installation of water diversion BMPs), background samples will be collected at each project site. Background samples will be collected a minimum of 100 feet upstream of the active site. The receiving water samples will be collected as specified under Section IV, A. Field and water quality data and water samples will be collected at tidal and nontidal sites no earlier than 1 hour after project operations are initiated. At least two (2) samples per day, evenly spaced during work hours, will be collected (see Section IV, A). If any analysis indicates exceedance of a water quality limit specified in the WDR, procedures described in Section IV, A will be followed.

Discharge from temporary storage sites are not anticipated. However, water samples will be collected from temporary storage sites (if utilized) on every day a discharge occurs, per the WDR provisions.

REPORTING

Responsible Entity

The Countywide Watershed Programs Unit (CWPU) is responsible for implementing the field testing and sampling program as required in the WDR issued by the Regional Board for the program. The CWPU will evaluate the data for compliance with the requirements of the WDR and will inform the Watershed Program Support Unit (WPSU) of any noncompliance event.

Reports to the Regional Water Quality Control Board

Permit Violations

The CWPU will notify the Regional Board by telephone immediately of any permit violation in accordance with Section IV, A. The WPSU will authorize a shut down of the sediment removal activities until the causes of the violation have been determined and fully mitigated. The CWPU will then inform the Regional Board, by telephone of the findings and corrective actions taken, and will obtain permission from the Regional Board prior to restarting the sediment removal activities.

The CWPU will notify the Regional Board in writing within seven calendar days of the violation. The written report will include time and date of incident, duration and estimated volume of discharge or bypass. The report will also include a detailed discussion of the reasons for noncompliance and the specific steps that were or will be undertaken to correct the failure and prevent it from occurring again.

Final Monitoring Report

Upon completion of dredging, a draft annual monitoring report will be filed with the Regional Board within 60 days of completion of all dredging work conducted during the year. The report will include:

a. A transmittal letter which includes a summary of all violations of WDR, any changes to the project design, and any unplanned releases or failures that occurred during the sediment removal operations;

b. The report shall provide: the magnitude of the releases or failures; any discharge limit exceedances; dates of all exceedances, cause of the failures, releases or other violations; any corrective actions taken or planned; and the dates of completion of corrective action; and

c. Within 30 days after receipt of agency comments on the draft monitoring report, a final monitoring report will be filed with the Regional Board. Final report and the letter transmitting report will be signed by a principal executive officer(s) of the District or by a duly authorized representative of that person.

TABLE 2

Water Quality Exceedance Limits

Sample Location/Parameter	Exceedance Limit
Tidal/Nontidal Sites	
pH	>0.5 units deviation from background
Dissolved Oxygen	minimum of 5.0 mg/l *or* no change if background <5.0 mg/l
Dissolved Sulfides	0.1 mg/l *or* no change if background >0.1 mg/l
Turbidity	5 NTUs if background ≤50 NTUs and 10 percent if background >50 NTUs
Temporary Storage Sites	
pH	6.5-8.5
Total Settleable Solids	1.0 mg/l/hr
Dissolved Sulfides	0.1 mg/l

TABLE 3
Field and Laboratory Analysis Parameters for Water Quality Samples

Parameter	Units	Methodology	EPA Method	Maximum Holding Time	Preservation	Target Detection Limit	MS/MD Precision (%RPD)	Sample Duplicate Precision (%RPD)
pH	pH	pH Electrode	150.1	Analyze Immediately	None	—	NA	NA
Turbidity	NTU	Nephelometric	180.1	48 hours	Cool 4°C	1	NA	NA
Dissolved Oxygen	mg/l	Membrane Electrode	360.1	Analyze Immediately	None	1	NA	NA
Dissolved Sulfide	mg/l	Titration or Colorimetric	376.1 376.2	6 months	Zinc Acetate pH 9	0.01	<25	<35
Settleable Solids	mg/l/hr	Volumetric or Gravimetric	160.5	24 hours	Cool 4°C	0.1	NA	<15
Suspended Solids	mg/l	Gravimetric	160.2	7 days	Cool 4°C	10	NA	<15
Ammonia	mg/l	Electrode	350.1	28 days	pH 2	1	NA	NA
Title 26 Metals	mg/l	ICP*/MS Cold Vapor (for Hg)	6010 7470 (for Hg)	6 months 28 days (for Hg)	Poly Container With Nitric Acid	See ** Below	35	35

*ICP is inductively coupled plasma spectroscopy by EPA Method 6010.
Hg is mercury.
**Antimony: 60 ug/L; Arsenic: 5 ug/L; Barium: 10 ug/L; Beryllium: 2 ug/L; Cadmium: 5 ug/L; Chromium: 10 ug/L; Cobalt: 20 ug/L; Copper: 10 ug/L; Lead: 3 ug/L; Mercury: 0.2 ug/L; Molybdenum: 20 ug/L; Nickel: 20 ug/L; Selenium: 5 ug/L; Silver: 5 ug/L; Thallium: 5 ug/L; Vanadium: 10 ug/l; Zinc: 20 ug/L

APPENDIX A

Field Reporting Forms and Chain of Custody Forms

FIELD REPORTING FORM—TIDAL SITES

Today's DATE:________ SITE NAME and CODE________________________

DATE/TIME OPERATIONS BEGAN:_____________ SITE LOCATION_______

STANDARD OBSERVATIONS

WEATHER CONDITIONS

AIR TEMPERATURE:_________ PRECIPITATION:____________

WIND DIRECTION AND VELOCITY (source):___________________________

TIDES Corrected LOW (Time/Height)___________________________________

Corrected HIGH (Time/Height)___________________________________

VISUAL

Floating Suspended Materials	PRESENT_______	ABSENT_________
Turbidity/Discoloration	PRESENT_______	ABSENT_________

If present, describe suspected source and estimate of affected area:

SITE COORDINATOR NOTIFIED: YES (Time/Name)___________ NO___

ODOR PRESENT_______ ABSENT_________

If present, describe suspected source and estimate of affected area (include wind direction and distance of travel):

SITE COORDINATOR NOTIFIED: YES (Time/Name)___________ NO___

SAMPLE COLLECTION

Time	Depth	Location (Attach Map)	Sample Code (EX:STADS1)

FIELD REPORTING FORM—NONTIDAL SITES

Today's DATE:_________ SITE NAME and CODE___________________________

DATE/TIME OPERATIONS BEGAN:_______________ SITE LOCATION________

STANDARD OBSERVATIONS

WEATHER CONDITIONS

AIR TEMPERATURE:__________ PRECIPITATION:______________

WIND DIRECTION AND VELOCITY (source):_______________________________

FLOW Estimated Rate or Volume____

VISUAL

Floating Suspended Materials	PRESENT________	ABSENT__________
Turbidity/Discoloration	PRESENT________	ABSENT__________

If present, describe suspected source and estimate of affected area:

SITE COORDINATOR NOTIFIED: YES (Time/Name)_____________ NO___

ODOR PRESENT________ ABSENT__________

If present, describe suspected source and estimate of affected area (include wind direction and distance of travel):

SITE COORDINATOR NOTIFIED: YES (Time/Name)_____________ NO___

SAMPLE COLLECTION

Time	Depth	Location (Attach Map)	Sample Code (EX:STADS1)

FIELD REPORTING FORM—TEMPORARY STORAGE SITES

Today's DATE:________ SITE NAME and CODE__________________________

DATE/TIME OPERATIONS BEGAN:______________ SITE LOCATION_______

STANDARD OBSERVATIONS

WEATHER CONDITIONS

AIR TEMPERATURE:_________ PRECIPITATION:_____________

WIND DIRECTION AND VELOCITY (source):_____________________________

FLOW Estimated Rate or Volume____

VISUAL

Floating Suspended Materials	PRESENT_______	ABSENT_________
Turbidity/Discoloration	PRESENT_______	ABSENT_________

If present, describe suspected source and estimate of affected area:

SITE COORDINATOR NOTIFIED: YES (Time/Name)___________ NO___

ODOR PRESENT_______ ABSENT_________

If present, describe suspected source and estimate of affected area (include wind direction and distance of travel):

SITE COORDINATOR NOTIFIED: YES (Time/Name)___________ NO___

SAMPLE COLLECTION

Time	Depth	Location (Attach Map)	Sample Code (EX:STADS1)

FIELD INSTRUMENT ANALYSES

SAMPLE ID________________ OPERATOR_____ ANALYSIS DATE_____________

TURBIDITY Instrument Number__________________

TEST 1: Time Started_______ Time Ended______ Result_______NTU

TEST 2: Time Started_______ Time Ended______ Result_______NTU

TEST 3: Time Started_______ Time Ended______ Result_______NTU

SITE COORDINATOR NOTIFIED: YES (Time/Name)____________ NO___

DISSOLVED OXYGEN Instrument Number__________________

TEST 1: Time Started_______ Time Ended______ Result_______mg/l

TEST 2: Time Started_______ Time Ended______ Result_______mg/l

TEST 3: Time Started_______ Time Ended______ Result_______mg/l

SITE COORDINATOR NOTIFIED: YES (Time/Name)____________ NO___

pH Instrument Number__________________

TEST 1: Time Started_______ Time Ended______ Result_______

TEST 2: Time Started_______ Time Ended______ Result_______

TEST 3: Time Started_______ Time Ended______ Result_______

SITE COORDINATOR NOTIFIED: YES (Time/Name)____________ NO___

COMMENTS/NOTES:

APPENDIX B

Sample Documentation Procedures

SAMPLE DOCUMENTATION PROCEDURES

B.1 PURPOSE

This section describes the procedures to be used by the District's personnel when obtaining environmental samples. The procedures, when properly followed, will ensure a high quality of analytical results, complete documentation, and consistent sampling methodology for collecting surface water samples.

B.2 SAMPLING PROCEDURE

B.2.1 Sample Containers, Container Labeling, and Preservation

Samples shall be collected and contained in clean containers provided by the District's contract laboratory. After each sample has been placed inside a container, the container shall be capped and affixed with a label. The labels will be provided by the District's contract laboratory. A photocopy of a typical label with the complete information is attached at the end of this section. The District personnel must ensure that each label is filled out completely with permanent waterproof ink and contains, at a minimum, the following information:

a. Sampling date and time

b. Name of sampler

c. Type of media (solid, liquid, sludge)

d. Sample identification number (should include reference to water body and date)

e. Site name (should include reference to water body and date)

f. Sample location

g. Analytical method requested (Environmental Protection Agency [EPA] method)

Samples shall be kept in a cooler (located in the CWPU storage shed) with blue ice at 4° C at all times after the samples are collected until they are delivered and accepted by the laboratory.

B.2.2 Chain of Custody

District personnel will fill out the District's Chain of Custody (COC) for the samples collected from each site. Blank copies of the COC are kept at the District office. A sample of a completed District COC is attached. Using the COC will document the possession of a sample from the time it is taken in the field until after it is accepted by the laboratory. The District's COC or other type of COC to be used must contain, at a minimum, the following information:

a. Site name and location

b. Name of person collecting samples

c. Sample identification number (should include reference to water body and date)

d. Location where sample is collected

e. Type of sample (soil, water, or sludge)

f. Sampling date and time

g. Turn around time requested

h. Analytical methods requested (EPA Method)

i. Signature block containing name, date, and time showing persons having custody of the samples

B.2.3 Sample Transport

The samples shall be transported inside a cooler with frozen blue ice. The samples will be brought back to the District office, stored, and locked in the sample refrigerator until the laboratory can pick them up. The District's contract laboratory must be contacted 4 hours in advance of the pick up time in order to perform a transfer of the samples. An entry into the sample refrigerator logbook shall be made indicating the time of day and temperature of the sample refrigerator every time this refrigerator is used. The COC will be signed over to the refrigerator if the samples are stored there, and the laboratory courier will sign them out of the refrigerator prior to transport to the laboratory. Arrangements may be made with the laboratory so that the samples are picked up in the field by the laboratory's courier.

B.2.4 Equipment Decontamination

Clean equipment shall be used to ensure that cross contamination will not occur during the sampling process. When possible, disposable sampling equipment or a sampling technique that does not necessitate equipment contamination shall be used to avoid generating wastewater from decontamination.

When equipment decontamination is necessary, the equipment shall be properly brushed with a trisodium phosphate solution, triple rinsed in deionized water, and wiped with clean paper towels or allowed to be air dried. Water from decontamination process can be contained and disposed with other wastes from the site.

B.2.5 Disposal of Contaminated Materials

Gloves and other equipment used in collecting samples can be rinsed off with deionized water and then contained and disposed with other wastes from the site.

B.2.6 Sample Documentation

The following items need to be documented when collecting samples:

a. Site name and site address

b. Name of person collecting samples

c. Sample identification number

d. Location where sample is collected

e. Type of sample (soil, water, or sludge)

f. Sampling date and time

g. Field conditions (rain, temperature)

h. Photographs of sample area

B.2.7 Sample Collection Methodologies

Collecting surface water samples:

a. Ensure proper health and safety precautions are implemented before proceeding.

b. Determine the type of analyses to be performed on the samples.

c. Refer to Field Instructions to determine the proper container and quantity of samples necessary for each type of analysis.

d. Wear proper personal protective equipment (PPE) to avoid contact with the material during sampling.

e. Place samples in a container. Properly secure the container, fill out the container label, affix the label onto the container, and place the container in a cooler with blue ice. Record the temperature of the cooler.

f. Properly clean and/or dispose of sampling and PPE used during sampling.

g. Properly fill out the COC and transport the samples back to the District office or meet with the laboratory courier.

ATTACHMENT 1

Example Sample Label

(Example Sample Label not available electronically))

ENVIRONMENTAL SAMPLING SUPPLY

LOT #
SAMPLE ID 1999CALERA01

SAMPLED BY MIKE HELLER	DATE 4-19-94 TIME 14:06
LOCATION CALERA CRK. ST 160+45	PRESERVATIVE —
ANALYSIS VARIOUS - SEE COC	CLIENT SCVWD

9601 San Leandro Street, Oakland, California 94603
(510) 562-4988 (800) 233-8425

ATTACHMENT 2

Example Chain of Custody

(Example Chain of Custody not available electronically) a Cl alle ter District

Almaden Expressway
ose, CA 95118
e: (408) 265-2600
(408) 266-0271

CHAIN OF CUSTODY

FC 1019 (08-05-98)

Project/Site Name: 1999 SEDIMENT REMOVAL	Laboratory: CLAYTON
Project Number:	Sampled by (Print): LAS
Site Location:	Requested By: MIKE HELLER

Sample ID#	Date Sampled	Time Sampled	Matrix	No. of Samples	Turn Around Time	TOTAL METALS	METALS WET	PESTICIDES - 8080	8141	PAH - 8100	MOISTURE	GRAIN SIZE (ASTM D422)	TEH	~~TOXICITY (CCR 22)~~	TOC	ASBESTOS - PLM	~~CHLORIDES~~	PH	TOTAL SULFIDES	AMMONIA	ATTERBERG LIMITS	REMARKS
SARATOGA 01A	6/21/99	13:50	S	1	COMPOSITE																	
SARATOGA 01B	6/21/99	13:34	S	1		X	X	X		X	X	X	X		X	X		X	X	X	X	PLEASE RECORD
SARATOGA 01C	6/21/99	13:10	S	1																		TEMP OF
SARATOGA 01D	6/21/99	13:00	S	1																		H2O VIAL
SARATOGA 02A	6/21/99	12:50	S	1	COMPOSITE																	UPON RECEIPT.
SARATOGA 02B	6/21/99	12:45	S	1		X	X	X	X	X	X	X	X		X	X		X	X	X	X	
SARATOGA 02C	6/21/99	12:35	S	1																		
SARATOGA 02D	6/21/99	12:30	S	1																		
SARATOGA HS01	6/21/99	12:07	S	3		X	X	X	X	X	X	X	X		X	X		X	X	X	X	

RIX ABBREVIATION - Soil = S; Water = W; Product = P

Send FAX Results to:

District Approval:

Authorization No:

Relinquished By (Signatures)/Affiliation:	Please Print Name	Received By (Signatures)/Affiliation	Please Print Name	Date	Time
	MIKE HELLER		[illegible]	[illegible]	[illegible]

ution: ORIGINAL–RETURN TO DISTRICT WITH RESULTS, YELLOW–Laboratory, PINK–District

Page of

APPENDIX F:

ANNUAL REPORTING TO AGENCIES

MULTI-YEAR STREAM MAINTENANCE PROGRAM

SANTA CLARA VALLEY WATER DISTRICT

ANNUAL REPORTING TO AGENCIES

February 2002

ANNUAL REPORTING

The Santa Clara Valley Water District (District) proposes annual monitoring associated with the Multi-Year Stream Maintenance Program (SMP) consist of the following elements.

1. **Notification of Proposed Work** - A Notification of Proposed Work will be sent by May 1 of each year to notify the regulatory agencies of the projected sediment removal, channel/canal vegetation management, bank protection and minor maintenance work for the upcoming summer construction season. The regulatory agencies to be notified are: the US Army Corps of Engineers, National Marine Fisheries Service, US Fish and Wildlife Service, US Environmental Protection Agency, California Department of Fish and Game, and the San Francisco Bay and Central Coast regions of the Regional Water Quality Control Boards.

   This notification will include tables reporting the following information for each location of projected work: creek or canal name, location, type of work, length (feet and miles), and whether work has been conducted at this location in previous years under the SMP. For sediment removal, the projected amount of sediment to be removed will be estimated in cubic yards. For vegetation management, the work conducted in channels or canals will be designated as either hand removal or herbicide treatment. For bank protection, the method of bank repair will be reported along with the amount of impact, the amount and location of mitigation required or mitigation credit, as applicable, and the type of monitoring. The following information will be submitted for bank protection projects that require review by agencies: plan view, cross-section, photographs, repair method selected, brief description of why the method was selected, description of mitigation, if any, and identification of representative sites that will be monitored. The reporting tables will provide separate information for the Pajaro River Basin and the Santa Clara Basin. The tables will include sum totals for all major categories of work projected for that year, and cumulative totals for all previous years under the SMP.

   The Notification of Proposed Work will also include the water quality and sediment characterization reports, any pre-construction surveys for endangered species, a map showing all proposed work and mitigation sites, and any required fees.

   A report on the status of all mitigation projects will be included in the Notification of Proposed Work, as well as any new mitigation options which are proposed.

2. **Sediment Sampling** – results of pre-construction sediment sampling will be provided before construction is initiated and any revisions to disposal of sediment or relevant best management practices will be noted.

3. **Post-Construction Report** – A post-construction report will be sent December 15 of each year to notify the agencies of the sediment removal, channel/canal vegetation management, and bank protection maintenance work completed in the previous year. The reporting will include tables with the same information as for the Notification of Proposed Work but with actual amounts and locations of work completed.

   A map will show the location of all completed work and mitigation. Pre-and post-construction photographs for bank protection will be provided. A summary of the annual lessons-learned meeting will be provided including any revised or new Best Management Practices.

   Any performance evaluations for bank protection will be submitted (see attached bank protection worksheet). Any new designs developed for the bank protection program will be described.

   A report on any pre-construction and longer term surveys for endangered species will be included in the post-construction report.

   The post-construction report will include an update on any community programs the District has undertaken to control sediment and the status of projected sediment studies on the following creeks: San Francisquito, Lower Silver and Thompson regarding sediment related to Lake Cunningham, Upper Penitencia, Berryessa, Coyote, and Upper Llagas Creeks.

Some projects may be undertaken outside of the usual work period and thus will not be known as a projection for the annual May report. These projects will be included in the December report. After the first few years, it is expected that the amount of reporting will be reduced.

The District will attend the May interagency meeting (2nd Wednesday of the month) each year to discuss proposed projects and any concerns with agency staff. The intent of the meeting will be to streamline any review of proposed work.

The District will hold an annual Lessons Learned Session with regulatory agency staff in December of each year. The purpose of this session is to review lessons learned from completed projects, discuss the performance of each SMP components, and discuss changes to procedures, techniques, or BMPs.

The District person responsible for tracking the program and reporting compliance is the Deputy Operating Officer.

Example- Year 2005

ANNUAL NOTIFICATION OF PROPOSED WORK

Contents

1. Summary of Proposed Work
2. Sediment Removal
    - Pajaro River Basin
        - Proposed
        - Cumulative for 1-time accounting
    - Santa Clara Basin
        - Proposed
        - Cumulative for 1-time accounting
3. Vegetation Management
    - Pajaro River Basin (Hand Removal)
        - Proposed
        - Cumulative for 1-time accounting
    - Santa Clara Basin (Hand Removal and Herbicide)
        - Proposed
        - Cumulative for 1-time accounting
    - Detailed Report (MAXIMO)
4. Bank Protection
    - Pajaro River Basin
        - Proposed
        - Cumulative by Method
    - Santa Clara Basin
        - Proposed
        - Cumulative by Method
5. Mitigation Status

Example Year 2005

ANNUAL NOTIFICATION OF PROPOSED WORK SUMMARY

May 1, 2005

	Length (feet)	Length (miles)
Pajaro River Basin		
Sediment Removal	21,540	4.1
Vegetation Management – Hand Removal	211,200	40.0
Bank Protection		
Biotech/Rock toe	150	0.0
Seeded Earth	100	0.0
	250	0.0
Santa Clara Basin		
Sediment Removal	38,010	7.2
Vegetation Management		
Hand Removal	68,640	13.0
Herbicide	756,744	143.3
Bank Protection		
Biotech/Vegetated Rock Toe	500	0.1
Rocked Slope	540	0.1
Wooden Crib Wall	420	0.1
Biotech/Rock Toe	480	0.1
	1,940	0.4

Example Year 2005

ANNUAL NOTIFICATION OF PROPOSED WORK

SEDIMENT REMOVAL

MAY 2005

Year	Facility Number	Facility Name	Location (street names)	From Yellow Book Station	To Yellow Book Station	Length (feet)	Length (miles)	Volume Removed (cubic yards)	Same Work Performed in Previous Years Under SMP
I. PAJARO RIVER BASIN									
	Proposed Work								
2005	50xx	Creek 5	Location 5	0+00	20+00	2,000	0.4	600	2002
2005	50xx	Creek 6	Location 6	3+00	80+00	7,700	1.5	1,200	--
2005	50xx	Creek 7	Location 7	56+60	175+00	11,840	2.2	2,000	--
		Subtotal for proposed 2005 sediment removal				21,540	4.1	3,800	
		Less Repeat Areas				2,000	0.4		
		Estimated Total for One-Time Accounting for Pajaro River Basin				19,540	3.7		
	Cumulative Total for One-Time Accounting for Pajaro River Basin (excludes repeat work areas)								
2002						5,280	1.0		
2003						10,560	2.0		
2004						7,920	1.5		
		Total				23,760	4.5		

Stream Maintenance Program Projection of Sediment Removal Work for Pajaro River Basin (Extent of Maintenance) 11.0 over life of SMP

Sample- Year 2005

ANNUAL NOTIFICATION OF PROPOSED WORK

SEDIMENT REMOVAL

MAY 2005

Year	Facility Number	Facility Name	Location (street names)	From Yellow Book	To Yellow Book	Length (feet)	Length (miles)	Volume Removed (cubic yards)	Same Work Performed in Previous Years
II. SANTA CLARA BASIN									
	Proposed Work								
2005	10xx	Creek 1	Location 1	0+00	120+00	12,000	2.3	3,980	--
2005	20xx	Creek 2	Location 2	2+60	59+80	5,720	1.1	2,000	--
2005	20xx	Creek 3	Location 3	0+30	80+00	7,970	1.5	2,000	2003
2005	40xx	Creek 4	Location 4	9+20	12+80	360	0.1	400	--
2005	10xx	Creek 8	Location 5	0+00	10+00	1,000	0.2	3,980	--
2005	20xx	Creek 9	Location 6	22+00	125+00	10,300	2.0	40,000	--
2005	30xx	Creek 10	Location 7	0+30	3+00	270	0.1	650	2003
2005	30xx	Creek 11	Location 8	8+90	12+80	390	0.1	200	--
		Subtotal for proposed 2005 sediment removal				38,010	7.2	53,210	
		Less Repeat Areas				8,240	1.6		
		Estimated Total for One-Time Accounting for Santa Clara Basin				29,770	5.6		

Cumulative Total for One-Time Accounting for Santa Clara Basin (excludes repeat work areas)

Year		Length (feet)	Length (miles)
2002		52,800	10.0
2003		31,680	6.0
2004		63,360	12.0
	Total	147,840	28.0

Stream Maintenance Program Projection of Sediment Removal Work for Santa Clara Basin (Extent of Maintenance) 47.0 over life of SMP

ANNUAL NOTIFICIATION OF PROPOSED WORK

INSTREAM VEGETATION MANAGEMENT

MAY 2005

Example: Year 2005

Year	Activity		Length (feet)	Length (miles)

I. PAJARO RIVER BASIN

Proposed Work

See detailed report table for list of proposed vegetation management work in streams and canals in the Pajaro River Basin

Summary of Proposed Work for 2005

Year	Activity		Length (feet)	Length (miles)
2005	Channel and Canal Hand Removal	Subtotal for Proposed Work for Pajaro River Basin	211,200	40.0
2005	Channel and Canal Hand Removal	Estimated Total for One-Time Accounting for Pajaro River Basin (CM)	5,808	1.1

Cumulative Total for One-Time Accounting for Pajaro River Basin (excludes repeat work areas)

Year	Activity		Length (feet)	Length (miles)
2002	Channel and Canal Hand Removal		227,040	43.0
2003	Channel and Canal Hand Removal		0	0.0
2004	Channel and Canal Hand Removal		0	0.0
		Total	227,040	43.0

Stream Maintenance Program Projection of Instream Vegetation Management Work in Pajaro River Basin (Extent of Maintenance)

Activity	Length (miles)
Channel and Canal Hand Removal	47.0 over life of SMP

Example Year 2005

ANNUAL NOTIFICIATION OF PROPOSED WORK

INSTREAM VEGETATION MANAGEMENT

MAY 2005

Year	Activity		Length (feet)	Length (miles)
II. SANTA CLARA BASIN				

Proposed Work

See detailed report table for list of proposed vegetation management work in streams and canals in the Pajaro River Basin

Summary of Proposed Work for 2005

Year	Activity		Length (feet)	Length (miles)
2005	Channel and Canal Hand Removal	Subtotal for Proposed Work	68,640	13.0
2005	Channel and Canal Hand Removal	Estimated Total for One-Time Accounting for Santa Clara Basin (CM)	2,112	0.4
2005	Channel and Canal Herbicide	Subtotal for Proposed Work	756,744	143.3
2005	Channel and Canal Herbicide	Estimated Total for One-Time Accounting for Santa Clara Basin (CM)	3,168	0.6

Cumulative Total for One-Time Accounting for Santa Clara Basin (excludes repeat work areas)

Year	Activity		Length (feet)	Length (miles)
2002	Channel and Canal Hand Removal		73,920	14.0
2003	Channel and Canal Hand Removal		2,112	0.4
2004	Channel and Canal Hand Removal		2,112	0.4
		Total	78,144	14.8
2002	Channel and Canal Herbicide		950,400	180.0
2003	Channel and Canal Herbicide		1,584	0.3
2004	Channel and Canal Herbicide		1,056	0.2
		Total	953,040	180.5

Stream Maintenance Program Projection of Instream Vegetation Management Work in Santa Clara Basin (Extent of Maintenance)

Channel and Canal Hand Removal	16	over life of SMP
Channel and Canal Herbicide	183	over life of SMP

Sample Year 2005

ANNUAL NOTIFICIATION OF PROPOSED WORK
INSTREAM VEGETATION MANAGEMENT - DETAILED REPORT
MAY 2005

Year	Activity	Facility Number	Facility Name	Location (street names)	From Yellow Book Station	To Yellow Book Station	Length (feet)	Length (miles)	Same Work Performed in Previous Years Under SMP
I. PAJARO RIVER BASIN									
	Proposed Work								
2005	Channel and Canal Hand Removal	50xx	-- Creek	d/s xxx Street	0+00	211+20	21,120	4.0	Annual Frequency
2005	Channel and Canal Hand Removal	50xx	-- Creek	d/s xxx Street	62+00	120+08	5,808	1.1	CM
2005	Channel and Canal Hand Removal	50xx	-- Creek	d/s xxx Street	62+01	426+33	36,432	6.9	Annual Frequency
2005	Channel and Canal Hand Removal	50xx	-- Creek	d/s xxx Street	62+02	273+22	21,120	4.0	Annual Frequency
2005	Channel and Canal Hand Removal	50xx	-- Creek	d/s xxx Street	62+03	273+23	21,120	4.0	Annual Frequency
2005	Channel and Canal Hand Removal	50xx	-- Creek	d/s xxx Street	62+04	273+24	21,120	4.0	Annual Frequency
2005	Channel and Canal Hand Removal	50xx	-- Creek	d/s xxx Street	62+05	273+25	21,120	4.0	Annual Frequency
2005	Channel and Canal Hand Removal	50xx	-- Creek	d/s xxx Street	62+06	273+26	21,120	4.0	Annual Frequency
2005	Channel and Canal Hand Removal	50xx	-- Creek	d/s xxx Street	62+07	273+27	21,120	4.0	Annual Frequency
2005	Channel and Canal Hand Removal	50xx	-- Creek	d/s xxx Street	62+08	273+28	21,120	4.0	Annual Frequency
		Subtotal for proposed work					211,200	40.0	
		Estimated Total for One-Time Accounting for Pajaro River Basin (CM)					5,808	1.1	

Example Year 2005

ANNUAL NOTIFICIATION OF PROPOSED WORK
INSTREAM VEGETATION MANAGEMENT - DETAILED REPORT
MAY 2005

Year	Activity	Facility Number	Facility Name	Location (street names)	From Yellow Book Station	To Yellow Book Station	Length (feet)	Length (miles)	Same Work Performed in Previous Years Under SMP
II. SANTA CLARA BASIN									
	Proposed Work								
2005	Channel and Canal Hand Removal	40xx	-- Creek	d/s xxx Street	0+00	79+20	7,920	1.5	Annual Frequency
2005	Channel and Canal Hand Removal	30xx	-- Creek	d/s xxx Street	25+00	77+80	5,280	1.0	Annual Frequency
2005	Channel and Canal Hand Removal	30xx	-- Creek	d/s xxx Street	26+17	52+57	2,640	0.5	Annual Frequency
2005	Channel and Canal Hand Removal	30xx	-- Creek	d/s xxx Street	27+34	53+74	2,640	0.5	Annual Frequency
2005	Channel and Canal Hand Removal	30xx	-- Creek	d/s xxx Street	28+51	54+91	2,640	0.5	Annual Frequency
2005	Channel and Canal Hand Removal	30xx	-- Creek	d/s xxx Street	29+68	82+48	5,280	1.0	Annual Frequency
2005	Channel and Canal Hand Removal	30xx	-- Creek	d/s xxx Street	30+85	83+65	5,280	1.0	Annual Frequency
2005	Channel and Canal Hand Removal	30xx	-- Creek	d/s xxx Street	32+02	84+82	5,280	1.0	Annual Frequency
2005	Channel and Canal Hand Removal	30xx	-- Creek	d/s xxx Street	33+19	75+43	4,224	0.8	Annual Frequency
2005	Channel and Canal Hand Removal	30xx	-- Creek	d/s xxx Street	34+36	44+92	1,056	0.2	CM
2005	Channel and Canal Hand Removal	10xx	-- Creek	d/s xxx Street	0+00	20+00	2,640	0.5	Annual Frequency
2005	Channel and Canal Hand Removal	20xx	-- Creek	d/s xxx Street	0+00	67+00	6,864	1.3	Annual Frequency
2005	Channel and Canal Hand Removal	10xx	-- Creek	d/s xxx Street	0+00	20+00	2,640	0.5	Annual Frequency
2005	Channel and Canal Hand Removal	10xx	-- Creek	d/s xxx Street	0+24	21+22	2,640	0.5	Annual Frequency
2005	Channel and Canal Hand Removal	10xx	-- Creek	d/s xxx Street	0+48	22+44	2,640	0.5	Annual Frequency
2005	Channel and Canal Hand Removal	10xx	-- Creek	d/s xxx Street	0+72	23+66	2,640	0.5	Annual Frequency
2005	Channel and Canal Hand Removal	10xx	-- Creek	d/s xxx Street	0+96	24+88	2,640	0.5	Annual Frequency
2006	Channel and Canal Hand Removal	30xx	-- Creek	d/s xxx Street	1+20	11+76	1,056	0.2	CM
2005	Channel and Canal Hand Removal	10xx	-- Creek	d/s xxx Street	1+20	26+10	2,640	0.5	Annual Frequency
		Subtotal for proposed work					68,640	13.0	
		Estimated Total for One-Time Accounting for Santa Clara Basin (CM)					2,112	0.4	
2005	Channel and Canal Herbicide	10xx	-- Creek	d/s xxx Street	19+40	811+40	79,200	15.0	Annual Frequency
2005	Channel and Canal Herbicide	30xx	-- Creek	d/s xxx Street	18+00	757+20	73,920	14.0	Annual Frequency
2005	Channel and Canal Herbicide	10xx	-- Creek	d/s xxx Street	19+40	705+80	68,640	13.0	Annual Frequency
2005	Channel and Canal Herbicide	10xx	-- Creek	d/s xxx Street	20+25	865+05	84,480	16.0	Annual Frequency
2005	Channel and Canal Herbicide	10xx	-- Creek	d/s xxx Street	21+10	918+70	89,760	17.0	Annual Frequency
2005	Channel and Canal Herbicide	10xx	-- Creek	d/s xxx Street	21+95	1341+95	132,000	25.0	Annual Frequency
2005	Channel and Canal Herbicide	10xx	-- Creek	d/s xxx Street	22+80	814+80	79,200	15.0	Annual Frequency
2005	Channel and Canal Herbicide	10xx	-- Creek	d/s xxx Street	23+65	815+65	79,200	15.0	Annual Frequency
2005	Channel and Canal Herbicide	10xx	-- Creek	d/s xxx Street	24+50	563+06	53,856	10.2	Annual Frequency
2005	Channel and Canal Herbicide	20xx	-- Creek	d/s xxx Street	26+00	57+68	3,168	0.6	CM
2005	Channel and Canal Herbicide	10xx	-- Creek	d/s xxx Street	0+50	20+00	1,950	0.4	Annual Frequency
2005	Channel and Canal Herbicide	30xx	-- Creek	d/s xxx Street	0+00	15+00	1,500	0.3	Annual Frequency
2005	Channel and Canal Herbicide	10xx	-- Creek	d/s xxx Street	0+50	20+00	1,950	0.4	Annual Frequency
2005	Channel and Canal Herbicide	10xx	-- Creek	d/s xxx Street	0+81	20+43	1,962	0.4	Annual Frequency
2005	Channel and Canal Herbicide	10xx	-- Creek	d/s xxx Street	1+12	20+86	1,974	0.4	Annual Frequency
2005	Channel and Canal Herbicide	10xx	-- Creek	d/s xxx Street	1+43	21+29	1,986	0.4	Annual Frequency
2005	Channel and Canal Herbicide	10xx	-- Creek	d/s xxx Street	1+74	21+72	1,998	0.4	Annual Frequency
		Subtotal for proposed work					756,744	143.3	
		Estimated Total for One-Time Accounting for Santa Clara Basin (CM)					3,168	0.6	

Example Year 2005

ANNUAL NOTIFICIATION
BANK PROTECTION
May 2005

Year	Facility Number	Monitoring Requirements	Facility Name	Location (street names)	Facility Type	From Yellow Book Station	To Yellow Book Station	Length (feet)	Length (miles)	Method of Repair	Impact Area (acres)	Mitigation Required (acres)
I. PAJARO RIVER BASIN												
	Proposed Work											
2005	50xx	*	Creek 5	Location 5	E	0+00	1+50	150	0.0	Biotech/Rock Toe	0.01	0.01
2005	50xx		Creek 6	Location 6	C	3+00	4+00	100	0.0	Seeded Earth	--	--
			Total					250	0.0		0.01	0.01
	Cumulative Total for Pajaro River Basin from 2002 to present (includes proposed work)											
								1,440	0.3	Biotech/Rock Toe	0.15	0.15
								4,200	0.8	Seeded Earth	--	--
			Total					5,640	1.1		0.15	0.15

Example Year 2005

ANNUAL NOTIFICIATION
BANK PROTECTION
May 2005

Year	Facility Number	Monitoring Requirements	Facility Name	Location (street names)	Facility Type	From Yellow Book Station	To Yellow Book Station	Length (feet)	Length (miles)	Method of Repair	Impact Area (acres)	Mitigation Required (acres)
II. SANTA CLARA BASIN												
Proposed Work												
2005	10xx	**	Creek 1	Location 1	E,C	0+00	5+00	500	0.1	Biotech/Veg. Rock Toe	0.05	0.05
2005	20xx		Creek 2	Location 2	E	2+60	8+00	540	0.1	Rock Slope	0.17	0.52
2005	20xx		Creek 3	Location 3	E	0+30	4+50	420	0.1	Wooden Crib Wall	--	--
2005	40xx	*	Creek 4	Location 4	C	9+20	14+00	480	0.1	Biotech/Rock Toe	0.03	0.03
			Total					1,940	0.4		0.25	0.60
Cumulative Total for Santa Clara Basin from 2002 to present (includes proposed work)												
								5,000	0.9	Biotech/Rock Toe	0.28	0.28
								5,700	1.1	Biotech/Veg. Rock Toe	0.51	0.51
								2,000	0.4	Rock Slope	0.69	2.08
								1,500	0.3	Wooden Crib Wall	--	0.00
								1,350	0.3	Seeded Earth	--	--
			Total					15,550	2.9		1.48	2.87
COUNTY TOTALS:												
2005 Total of Proposed Bank Protection in Santa Clara County												
								630	0.1	Biotech/Rock Toe	0.08	0.09
								500	0.1	Biotech/Veg. Rock Toe	0.05	0.05
								540	0.1	Rock Slope	0.17	0.52
								420	0.1	Wooden Crib Wall	--	--
								100	0.0	Seeded Earth	--	--
			Total					2,190	0.4		0.30	0.65
Cumulative Total for Santa Clara County from 2002 to present (includes proposed work)												
								6,440	1.2	Biotech/Rock Toe	0.43	0.43
								5,700	1.1	Biotech/Veg. Rock Toe	0.51	0.51
								2,000	0.4	Rock Slope	0.69	2.08
								1,500	0.3	Wooden Crib Wall	--	0.00
								5,550	1.1	Seeded Earth	0.00	0.00
			Total					21,190	4.0		1.63	3.02

A total of 15 sites over the 10 years will have additional monitoring as shown on the monitoring form.

Selected Sites will be Monitored in Years 1, 3, and 5 after repair indicated by a * . Sites with additional monitoring per form indicated by **

Example Year 2005

MITIGATION REPORTING

May 2005

Site Name	Creek Name	Location	Size (acres)	Mitigation Credit Amount	Status
I. Pajaro River Basin					
A. Freshwater Wetland Creation					
Church Pond No. 2	adjacent to Llagas Creek	intersection of Llagas and Church Aves	4.0	4.0	Feb 2003 - mitigation & monitoring plan. Jun 2003 - detailed design. Jul 2003 - construction *Currently under maintenance & monitoring.*
B. Stream and Watershed Protection					
Parcel 1234	Uvas		55.0	5.6	Dec 2002 - purchased.
Parcel 5689	Tick		19.0	2.2	Mar 2003 - purchased. Jan 2004 - design of restoration of former road crossing. *Aug 2005 - installation of new road crossing, plants.*

Example: Year 2005

MITIGATION REPORTING

May 2005

Site Name	Creek Name	Location	Size (acres)	Mitigation Credit Amount	Status
C. Control of Giant Reed (note: also applies towards lagtime.)					
2002 - 3 new sites	Llagas		3.0	3.0	Aug 2002 - field mapping of 75% of county stands. Sep 2002 - initial control of 3 new acres. Oct 2002 - south county workshop.
2003 - 5 new sites	West Little Llagas, Uvas		6.0	6.0	Aug 2003 - field mapping of 25% of county stands. Sep 2003 - initial control of 6 new acres; followup control. Oct 2003 - GIS mapping of all county stands.
2004 - 7 new sites	Llagas, Lions		5.5	5.5	Jun 2004 - workshop with County parks. Sep 2004 - initial control of 5.5 new acres, followup control. Oct 2004 - revegetation of 2 acres.
2005 - 6 sites	Llagas, Uvas		*6.0*	*6.0*	*June 2004 - workshop at Beeston property.* *Sep 2005 - initial control of 6 new acres, followup control.* *Oct 2005 - revegetation of 1 acre.*

Example - Year 2005

MITIGATION REPORTING
May 2005

II. Santa Clara Basin

A. Freshwater Wetland Creation

Site Name	Creek Name	Location	Size (acres)	Mitigation Credit Amount	Status
Los Capitancillos	adjacent to Guadalupe Ck	Coleman Rd & Redmond Ave	3.0	3.0	Jun 1998 - preliminary mitigation & monitoring plan. Feb 2002 - detailed design and mitigation & monitoring plan. Jul 2002 - installed. *Currently under maintenance & monitoring.*
Coyote Lakes Park Site 10A	adjacent to Coyote Ck	Upstream of interstions of Highways 101 and 85	*7.0*	*7.0*	Apr 2001 - mitigation and monitoring plan Jun 2004 - preliminary design & engineering report. *Aug 2005 - construction.*

B. Stream and Watershed Protection

Site Name	Creek Name	Location	Size (acres)	Mitigation Credit Amount	Status
Parcel 1011	Coyote		95.0	10.0	Sep 2002 - purchased. Sep 2003 - stockponds retrofitted for red-legged frog.
Parcel 1213	Stevens		155.0	16.0	Jul 2003 - purchased.
Parcel 1415	Coyote		35.0	4.0	Oct 2004 - purchased.

Example: Year 2005

MITIGATION REPORTING
May 2005

Site Name	Creek Name	Location	Size (acres)	Mitigation Credit Amount	Status
C. Control of Giant Reed (note: also applies towards lagtime.)					
2002 - 4 new sites	Coyote, Guadalupe		8.0	8.0	Aug 2002 - field mapping of 75% of county stands. Sep 2002 - initial control of 8 new acres.
2003 - 5 new sites	Coyote, Ross		5.0	5.0	Aug 2003 - field mapping of 25% of county stands. Sep 2003 - initial control of 5 new acres; followup control. Oct 2003 - GIS mapping of all county stands.
2004 - 7 new sites	Coyote, Stevens, Guadalupe Creek, Permanente		5.5	5.5	Jun 2004 - workshop with County parks. Sep 2004 - initial control of 5.5 new acres, followup control. Oct 2004 - revegetation of 4 acres.
2005 - 6 sites	Penitencia, San Tomas Aquino		*7.0*	*7.0*	*Sep 2005 - initial control of 7.0 new acres, followup control.* *Oct 2005 - revegetation of 4 acres.*
D. Tidal Wetland Restoration					
Pond A4	Guadalupe Slough		*30.0*	*30.0*	May 2005 - mitigation & monitoring plan. *May 2007 - detailed design.* *Jul 2007 - construction.*
E. Cordgrass Control					
Throughout tidal portions of County				lagtime	Oct 2002 - surveys completed. Jul 2003 - surveys completed. Oct 2003 - control of 2 sites. Jul 2004 - surveys completed. Oct 2004 - control of 3 new sites. *Jul 2005 - surveys.*

Example Year 2005

POST CONSTRUCTION REPORT

Contents

1. Summary of Proposed Work
2. Sediment Removal
    - Pajaro River Basin
        - Proposed
        - Cumulative for 1-time accounting
    - Santa Clara Basin
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3. Vegetation Management
    - Pajaro River Basin (Hand Removal)
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    - Detailed Report (MAXIMO)
4. Bank Protection
    - Pajaro River Basin
        - Proposed
        - Cumulative by Method
    - Santa Clara Basin
        - Proposed
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5. Minor Work Activities

Example-Year 2005

POST CONSTRUCTION REPORT

SUMMARY

	Length (feet)	Length (miles)
Pajaro River Basin		
Sediment Removal	21,540	4.1
Vegetation Management – Hand Removal	211,200	40.0
Bank Protection		
Biotech/Rock toe	150	0.0
Seeded Earth	100	0.0
	250	0.0
Santa Clara Basin		
Sediment Removal	38,010	7.2
Vegetation Management		
Hand Removal	68,640	13.0
Herbicide	756,744	143.3
Bank Protection		
Biotech/Vegetated Rock Toe	500	0.1
Rocked Slope	540	0.1
Wooden Crib Wall	420	0.1
Biotech/Rock Toe	480	0.1
	1,940	0.4

Example Year 2005

POST CONSTRUCTION REPORT
SEDIMENT REMOVAL
DECEMBER 2005

Year	Facility Number	Facility Name	Location (street names)	From Yellow Book Station	To Yellow Book Station	Length (feet)	Length (miles)	Volume Removed (cubic yards)	Same Work Performed in Previous Years Under SMP
I. PAJARO RIVER BASIN									
	Work Accomplished								
2005	50xx	Creek 5	Location 5	0+00	20+00	2,000	0.4	600	2002
2005	50xx	Creek 6	Location 6	3+00	80+00	7,700	1.5	1,200	--
2005	50xx	Creek 7	Location 7	56+60	175+00	11,840	2.2	2,000	--
		Subtotal for 2005 sediment removal				21,540	4.1	3,800	
		Less Repeat Areas				2,000	0.4		
		Total for One-Time Accounting for Pajaro River Basin				19,540	3.7		
	Cumulative Total for One-Time Accounting for Pajaro River Basin (excludes repeat work areas)								
2002						5,280	1.0		
2003						10,560	2.0		
2004						7,920	1.5		
2005						19,540	3.7		
		Total				43,300	8.2		
	Stream Maintenance Program Projection of Sediment Removal Work in Pajaro River Basin (Extent of Maintenance)						11.0 over life of SMP		

Example- Year 2005

POST CONSTRUCTION REPORT
SEDIMENT REMOVAL
DECEMBER 2005

Year	Facility Number	Facility Name	Location (street names)	From Yellow Book Station	To Yellow Book Station	Length (feet)	Length (miles)	Volume Removed (cubic yards)	Same Work Performed in Previous Years Under SMP
II. SANTA CLARA BASIN									
	Work Accomplished								
2005	10xx	Creek 1	Location 1	0+00	120+00	12,000	2.3	3,980	--
2005	20xx	Creek 2	Location 2	2+60	59+80	5,720	1.1	2,000	--
2005	20xx	Creek 3	Location 3	0+30	80+00	7,970	1.5	2,000	2003
2005	40xx	Creek 4	Location 4	9+20	12+80	360	0.1	400	--
2005	10xx	Creek 8	Location 5	0+00	10+00	1,000	0.2	3,980	--
2005	20xx	Creek 9	Location 6	22+00	125+00	10,300	2.0	40,000	--
2005	30xx	Creek 10	Location 7	0+30	3+00	270	0.1	650	2003
2005	30xx	Creek 11	Location 8	8+90	12+80	390	0.1	200	--
		Subtotal for 2005 sediment removal				38,010	7.2	53,210	
		Less Repeat Areas				8,240	1.6		
		Total for One-Time Accounting for Santa Clara Basin				29,770	5.6		
	Cumulative Total for One-Time Accounting for Santa Clara Basin (excludes repeat work areas)								
2002						52,800	10.0		
2003						31,680	6.0		
2004						63,360	12.0		
2005						29,770	5.6		
		Total				177,610	33.6		
	Stream Maintenance Program Projection of Sediment Removal Work in Santa Clara Basin (Extent of Maintenance)						47.0 over life of SMP		

Example: Year 2005

POST CONSTRUCTION REPORT
INSTREAM VEGETATION MANAGEMENT
DECEMBER 2005

Year	Activity		Length (feet)	Length (miles)	
I. PAJARO RIVER BASIN					
	Work Accomplished				
	See detailed report table for list of vegetation management work completed in streams and canals in the Pajaro River Basin				
	Summary of Work Accomplished 2005				
2005	Channel and Canal Hand Removal	Total Work Accomplished for Pajaro River Basin (PM)	211,200	40.0	
2005	Channel and Canal Hand Removal	Total for One-Time Accounting for Pajaro River Basin (CM)	5,808	1.1	
	Cumulative Total for One-Time Accounting for Pajaro River Basin (excludes repeat work areas)				
2002	Channel and Canal Hand Removal		227,040	43.0	
2003	Channel and Canal Hand Removal		0	0.0	
2004	Channel and Canal Hand Removal		0	0.0	
2005	Channel and Canal Hand Removal		5,808	1.1	
		Total	232,848	44.1	
	Stream Maintenance Program Projection of Work in Instream Vegetation Management in Pajaro River Basin (Extent of Maintenance)				
	Channel and Canal Hand Removal			47.0	over life of SMP

Example Year 2005

POST CONSTRUCTION REPORT
INSTREAM VEGETATION MANAGEMENT
DECEMBER 2005

II. SANTA CLARA BASIN

Work Accomplished

See detailed report table for list of vegetation management work completed in streams and canals in the Santa Clara Basin

Summary of Work Accomplished

Year	Activity		Length (feet)	Length (miles)
2005	Channel and Canal Hand Removal	Total Work Accomplished for Santa Clara Basin (PM)	68,640	13.0
2005	Channel and Canal Hand Removal	Total for One-Time Accounting for Santa Clara Basin (CM)	2,112	0.4
2005	Channel and Canal Herbicide	Total Work Accomplished for Santa Clara Basin (PM)	756,744	143.3
2005	Channel and Canal Herbicide	Total for One-Time Accounting for Santa Clara Basin (CM)	3,168	0.6

Cumulative Total for One-Time Accounting for Santa Clara Basin (excludes repeat work areas)

Year	Activity		Length (feet)	Length (miles)
2002	Channel and Canal Hand Removal		73,920	14.0
2003	Channel and Canal Hand Removal		2,112	0.4
2004	Channel and Canal Hand Removal		2,112	0.4
2005	Channel and Canal Hand Removal		2,112	0.4
		Total	80,256	15.2
2002	Channel and Canal Herbicide		950,400	180.0
2003	Channel and Canal Herbicide		1,584	0.3
2004	Channel and Canal Herbicide		1,056	0.2
2005	Channel and Canal Herbicide		3,168	0.6
		Total	956,208	181.1

Stream Maintenance Program Projection of Instream Vegetation Management Work in Santa Clara Basin (Extent of Maintenance)

Activity	Length (miles)	
Channel and Canal Hand Removal	16.0	over life of SMP
Channel and Canal Herbicide	183.0	over life of SMP

Example - Year 2005

POST CONSTRUCTION REPORT
INSTREAM VEGETATION MANAGEMENT - DETAILED REPORT
DECEMBER 2005

Year	Activity	Facility Number	Facility Name	Location (street names)	From Yellow Book Station	To Yellow Book Station	Length (feet)	Length (miles)	Same Work Performed in Previous Years Under SMP
I. PAJARO RIVER BASIN									
	Work Accomplished								
2005	Channel and Canal Hand Removal	50xx	-- Creek	d/s xxx Street	0+00	211+20	21,120	4.0	Annual Frequency
2005	Channel and Canal Hand Removal	50xx	-- Creek	d/s xxx Street	62+00	120+08	5,808	1.1	CM
2005	Channel and Canal Hand Removal	50xx	-- Creek	d/s xxx Street	62+01	426+33	36,432	6.9	Annual Frequency
2005	Channel and Canal Hand Removal	50xx	-- Creek	d/s xxx Street	62+02	273+22	21,120	4.0	Annual Frequency
2005	Channel and Canal Hand Removal	50xx	-- Creek	d/s xxx Street	62+03	273+23	21,120	4.0	Annual Frequency
2005	Channel and Canal Hand Removal	50xx	-- Creek	d/s xxx Street	62+04	273+24	21,120	4.0	Annual Frequency
2005	Channel and Canal Hand Removal	50xx	-- Creek	d/s xxx Street	62+05	273+25	21,120	4.0	Annual Frequency
2005	Channel and Canal Hand Removal	50xx	-- Creek	d/s xxx Street	62+06	273+26	21,120	4.0	Annual Frequency
2005	Channel and Canal Hand Removal	50xx	-- Creek	d/s xxx Street	62+07	273+27	21,120	4.0	Annual Frequency
2005	Channel and Canal Hand Removal	50xx	-- Creek	d/s xxx Street	62+08	273+28	21,120	4.0	Annual Frequency
		Total Work Accomplished for Pajaro River Basin					211,200	40.0	
		Total for One-Time Accounting for Pajaro River Basin (CM)					5,808	1.1	

Example Year 2005

POST CONSTRUCTION REPORT
INSTREAM VEGETATION MANAGEMENT - DETAILED REPORT
DECEMBER 2005

Year	Activity	Facility Number	Facility Name	Location (street names)	From Yellow Book Station	To Yellow Book Station	Length (feet)	Length (miles)	Same Work Performed in Previous Years Under SMP
II. SANTA CLARA BASIN									
	Work Accomplished								
2005	Channel and Canal Hand Removal	40xx	-- Creek	d/s xxx Street	0+00	79+20	7,920	1.5	Annual Frequency
2005	Channel and Canal Hand Removal	30xx	-- Creek	d/s xxx Street	25+00	77+80	5,280	1.0	Annual Frequency
2005	Channel and Canal Hand Removal	30xx	-- Creek	d/s xxx Street	26+17	52+57	2,640	0.5	Annual Frequency
2005	Channel and Canal Hand Removal	30xx	-- Creek	d/s xxx Street	27+34	53+74	2,640	0.5	Annual Frequency
2005	Channel and Canal Hand Removal	30xx	-- Creek	d/s xxx Street	28+51	54+91	2,640	0.5	Annual Frequency
2005	Channel and Canal Hand Removal	30xx	-- Creek	d/s xxx Street	29+68	82+48	5,280	1.0	Annual Frequency
2005	Channel and Canal Hand Removal	30xx	-- Creek	d/s xxx Street	30+85	83+65	5,280	1.0	Annual Frequency
2005	Channel and Canal Hand Removal	30xx	-- Creek	d/s xxx Street	32+02	84+82	5,280	1.0	Annual Frequency
2005	Channel and Canal Hand Removal	30xx	-- Creek	d/s xxx Street	33+19	75+43	4,224	0.8	Annual Frequency
2005	Channel and Canal Hand Removal	30xx	-- Creek	d/s xxx Street	34+36	44+92	1,056	0.2	CM
2005	Channel and Canal Hand Removal	10xx	-- Creek	d/s xxx Street	0+00	20+00	2,640	0.5	Annual Frequency
2005	Channel and Canal Hand Removal	20xx	-- Creek	d/s xxx Street	0+00	67+00	6,864	1.3	Annual Frequency
2005	Channel and Canal Hand Removal	10xx	-- Creek	d/s xxx Street	0+00	20+00	2,640	0.5	Annual Frequency
2005	Channel and Canal Hand Removal	10xx	-- Creek	d/s xxx Street	0+24	21+22	2,640	0.5	Annual Frequency
2005	Channel and Canal Hand Removal	10xx	-- Creek	d/s xxx Street	0+48	22+44	2,640	0.5	Annual Frequency
2005	Channel and Canal Hand Removal	10xx	-- Creek	d/s xxx Street	0+72	23+66	2,640	0.5	Annual Frequency
2005	Channel and Canal Hand Removal	10xx	-- Creek	d/s xxx Street	0+96	24+88	2,640	0.5	Annual Frequency
2005	Channel and Canal Hand Removal	30xx	-- Creek	d/s xxx Street	1+20	11+76	1,056	0.2	CM
2005	Channel and Canal Hand Removal	10xx	-- Creek	d/s xxx Street	1+20	26+10	2,640	0.5	Annual Frequency
		Total Work Accomplished for Santa Clara Basin					68,640	13.0	
		Total for One-Time Accounting for Santa Clara Basin (CM)					2,112	0.4	
2005	Channel and Canal Herbicide	10xx	-- Creek	d/s xxx Street	19+40	811+40	79,200	15.0	Annual Frequency
2005	Channel and Canal Herbicide	30xx	-- Creek	d/s xxx Street	18+00	757+20	73,920	14.0	Annual Frequency
2005	Channel and Canal Herbicide	10xx	-- Creek	d/s xxx Street	19+40	705+80	68,640	13.0	Annual Frequency
2005	Channel and Canal Herbicide	10xx	-- Creek	d/s xxx Street	20+25	865+05	84,480	16.0	Annual Frequency
2005	Channel and Canal Herbicide	10xx	-- Creek	d/s xxx Street	21+10	918+70	89,760	17.0	Annual Frequency
2005	Channel and Canal Herbicide	10xx	-- Creek	d/s xxx Street	21+95	1341+95	132,000	25.0	Annual Frequency
2005	Channel and Canal Herbicide	10xx	-- Creek	d/s xxx Street	22+80	814+80	79,200	15.0	Annual Frequency
2005	Channel and Canal Herbicide	10xx	-- Creek	d/s xxx Street	23+65	815+65	79,200	15.0	Annual Frequency
2005	Channel and Canal Herbicide	10xx	-- Creek	d/s xxx Street	24+50	563+06	53,856	10.2	Annual Frequency
2005	Channel and Canal Herbicide	20xx	-- Creek	d/s xxx Street	26+00	57+68	3,168	0.6	CM
2005	Channel and Canal Herbicide	10xx	-- Creek	d/s xxx Street	0+50	20+00	1,950	0.4	Annual Frequency
2005	Channel and Canal Herbicide	30xx	-- Creek	d/s xxx Street	0+00	15+00	1,500	0.3	Annual Frequency
2005	Channel and Canal Herbicide	10xx	-- Creek	d/s xxx Street	0+50	20+00	1,950	0.4	Annual Frequency
2005	Channel and Canal Herbicide	10xx	-- Creek	d/s xxx Street	0+81	20+43	1,962	0.4	Annual Frequency
2005	Channel and Canal Herbicide	10xx	-- Creek	d/s xxx Street	1+12	20+86	1,974	0.4	Annual Frequency
2005	Channel and Canal Herbicide	10xx	-- Creek	d/s xxx Street	1+43	21+29	1,986	0.4	Annual Frequency
2005	Channel and Canal Herbicide	10xx	-- Creek	d/s xxx Street	1+74	21+72	1,998	0.4	Annual Frequency
		Total Work Accomplished for Santa Clara Basin					756,744	143.3	
		Total for One-Time Accounting for Santa Clara Basin (CM)					3,168	0.6	

Example Year 2005

POST CONSTRUCTION REPORT
BANK PROTECTION UNDER STREAM MAINTENANCE PROGRAM
DECEMBER 2005

Year	Facility Number	Monitoring Requirements	Facility Name	Location (street names)	Facility Type	From Yellow Book Station	To Yellow Book Station	Length (feet)	Length (miles)	Method of Repair	Impact Area (acres)	Mitigation Required (acres)
I. PAJARO RIVER BASIN												
Completed Work												
2005	50xx	•	Creek 5	Location 5	E	0+00	1+50	150	0.0	Biotech/Rock Toe	0.01	0.03
2005	50xx		Creek 6	Location 6	C	3+00	4+00	100	0.0	Seeded Earth	--	--
			Total					250	0.0		0.01	0.03
Cumulative Total for Pajaro River Basin from 2002 to present (includes completed work)												
								1,440	0.3	Biotech/Rock Toe	0.15	0.45
								4,200	0.8	Seeded Earth	--	--
			Total					5,640	1.1		0.15	0.45

Example Year 2005

POST CONSTRUCTION REPORT
BANK PROTECTION UNDER STREAM MAINTENANCE PROGRAM
DECEMBER 2005

Year	Facility Number	Monitoring Require-ments	Facility Name	Location (street names)	Facility Type	From Yellow Book Station	To Yellow Book Station	Length (feet)	Length (miles)	Method of Repair	Impact Area (acres)	Mitigation Required (acres)
II. SANTA CLARA RIVER BASIN												
Completed Work												
2005	10xx	**	Creek 1	Location 1	E,C	0+00	5+00	500	0.1	Biotech/Veg. Rock Toe	0.05	0.05
2005	20xx		Creek 2	Location 2	E	2+60	8+00	540	0.1	Rock Slope	0.17	0.52
2005	20xx		Creek 3	Location 3	E	0+30	4+50	420	0.1	Wooden Crib Wall	--	--
2005	40xx	*	Creek 4	Location 4	C	9+20	14+00	480	0.1	Biotech/Rock Toe	0.03	0.08
			Total					1,940	0.4		0.25	0.65
Cumulative Total for Santa Clara Basin from 2002 to present (includes completed work)												
								5,000	0.9	Biotech/Rock Toe	0.28	0.84
								5,700	1.1	Biotech/Veg. Rock Toe	0.51	0.51
								2,000	0.4	Rock Slope	0.69	2.08
								1,500	0.3	Wooden Crib Wall	--	0.00
								1,350	0.3	Seeded Earth	--	--
			Total					15,550	2.9		1.48	3.43
COUNTY TOTALS:												
2005 **Total of Completed Bank Protection in Santa Clara County**												
								630	0.1	Biotech/Rock Toe	0.08	0.25
								500	0.1	Biotech/Veg. Rock Toe	0.05	0.05
								540	0.1	Rock Slope	0.17	0.17
								420	0.1	Wooden Crib Wall	--	--
								100	0.0	Seeded Earth	--	--
			Total					2,190	0.4		0.30	0.47
Cumulative Total for Santa Clara County from 2002 to present (includes completed work)												
								6,440	1.2	Biotech/Rock Toe	0.43	1.29
								5,700	1.1	Biotech/Veg. Rock Toe	0.51	0.51
								2,000	0.4	Rock Slope	0.69	2.08
								1,500	0.3	Wooden Crib Wall	--	0.00
								5,550	1.1	Seeded Earth	0.00	0.00
			Total					21,190	4.0		1.63	3.88

*** Sites with monoitoring years 1, 3 and 5 after construction.   ** Sites with additional monitoring**

ample Year 2005

Minor Work Activities
December 2005

ActivityType	Facility #	Facility Name	Location (street names)	From Yellow Book Station	To Yellow Book Station	Length (feet)	Impact by Habitat Type (acres)	
I. PAJARO RIVER BASIN								
	Work Accomplished							
cleanout culvert	5010	Llagas	100' downstream of Leavesly Road	329+30	329+50	20	<0.1	fw wetland
repair culvert	5044	Rucker Creek	D/S Pacheo Pass Hwy	68+55	68+85	30	<0.1	fw wetland
							<0.1	fw wetland
II. SANTA CLARA BASIN								
	Work Accomplished							
cleanout culvert	2019	San Tomas Aquino	D/S Highway 101	73+00	73+36	36	0.2	fw wetland
clean off stream gage	1029	Stevens Creek	2300' D/S L'Avenida	110+00	110+30	30	0.1	fw wetland
repair tide gate	1028	San Francisquito	Highway 237 to Tasman	7+00	7+75	75	0.2	tidal wetland
							0.3	fw wetland
							0.2	tidal wetland

BANK PROTECTION MONITORING

SELECTED SITES (YEARS 1, 3 AND 5 AFTER REPAIR)

Date: ____________________

Work Order No. ____________ Watershed: ______________________________

Facility Number: ____________ Creek: ______________________________

Location: ____

Station: from ____________ to ____________ Length: ______________

Repair Description: ____

Cause of Erosion: ____

Evidence of Erosion 200 feet upstream and downstream of site:

____

____

Condition of Repair:

____

____

Condition of Vegetative Component of Structure and Mitigation Site:

____

____

____

____

____

Additional Monitoring for specific streams (15 sites maximum)

Date of storm:____________ Flow rate: _________ Velocity: ____________________

Water level: _______ feet above invert

Attach photographs to be taken from same reference point(s) for each site.

APPENDIX G:

UNMODIFIED STREAMS

Appendix G

GUIDELINES FOR REDUCTION OF MAINTENANCE ACTIVITIES IN UNMODIFIED STREAMS

Revised: September 28, 2001

I. Purpose

The purpose of this document is to formally define work activities performed in the unmodified streams under the jurisdiction of the Santa Clara Valley Water District. Based on direction from the District's CEO and comments recently received from the United States Fish and Wildlife Service, staff is preparing formal guidelines defining when and how to conduct maintenance activities in unmodified streams. These guidelines will describe general work limitations and creek-specific resources protection measures. The unmodified streams in which work is projected under this program are listed in the attached table "Guidelines for Reduction of Maintenance Activities in Unmodified Streams" at the end of this document. Many are recognized as having significant ecological values which shall be preserved to the maximum extent while balancing the goals and requirements of the District as a resource manager.

II. Program Goals

The goal of this program is to provide the maintenance necessary to meet the District's ends policies and local ordinances and policies while implementing a standard even higher than that of the Stream Maintenance Program. The policies and ordinances that this work complies with include:

Board Ends Policy 1.2	There is reduced potential for flood damages
Board Ends Policy 2.1	Watersheds, streams and the natural resources therein are protected and when appropriate enhanced or restored.
Local Fire Codes	Requires control of combustible weeds and grasses
District Ordinance 83-2	Requires that an owner shall maintain a watercourse such that it does not contribute to pollution, so that it does not unreasonably change or retard the flow of the water and so that it is in a safe condition

III. Program Description

The District has jurisdiction of over 300 miles of unmodified creeks and projects that maintenance activities will occur on approximately 57 miles of them. Approximately 26 miles of the 57 miles have the capacity to contain the 100-year flows which meets the FEMA standard regarding flood insurance requirements and will be maintained to an appropriate standard. Approximately 4 miles of unmodified creeks will be modified as part of the District's Clean, Safe Creeks and Natural Flood Protection Program and are excluded from these guidelines.

As a result, these guidelines will apply to 27 miles of the 57 miles of unmodified streams where maintenance activities will occur. See page 5 of for the definition of unmodified stream for the purposes of this document.

This program will establish the criteria that will define when work is required:

- To provide the appropriate levels of protection to property from flood and fire danger on unmodified streams under District jurisdiction while preserving the environmental values of the streams to the maximum extent practicable.
- To perform corrective maintenance as needed to maintain this protection to the appropriate level, performing such maintenance only when necessary as defined in this document
- To strive to establish self-maintaining stream system where success is measured by the lack of need for in stream work to be performed.

A. Rationale for Performing Work on Unmodified Streams

In general, work will be performed on unmodified streams to:

1. Minimize dead and dry fuel loads for fire protection.
2. Clear debris blockages and downed trees that may cause flooding
3. Clear vegetation from known trouble spots prior to winter storms
4. Respond to concerns from the public or local governments relative to stream conditions

The rationale for performing these activities varies. The first activity is driven by fire code requirements and has specific outcomes defined by these requirements. The next three activities are done to reduce flood damage to the community. This document will help to define the rationale for these activities.

B. General Criteria for Vegetation Management

Reaches of unmodified streams of concern shall be surveyed prior to April 1st of each year by the vegetation planner. In stream areas with vegetation exceeding the established criteria shall be identified at this time. A list of these work areas will be submitted to the Watershed Manager for concurrence that the work is required and that no impacts to fish and wildlife above those projected and addressed in the SMP/EIR will result from the proposed work.

Existing native woody vegetation greater than six inches in diameter (measured at breast height) will be allowed to remain on the stream bottom. Only if the woody vegetation greater than 6 inches in diameter is directing flows at the banks causing excessive bank erosion or if it is causing debris dams which threaten to flood property may they be removed. Woody vegetation of less than six inches in diameter will be removed from channel bottoms to prevent debris dams that may cause flooding or property damage or hinder fish passage. Native woody vegetation shall be encouraged to establish on the banks to provide a natural canopy, maximize habitat, minimize the establishment of vegetative growth in the stream bottom and prevent erosion, in an effort to minimize the need for in stream maintenance.

C. General Criteria for Removal of Woody Debris and Blockages

Removal of woody debris and blockages will be reviewed on a case by case basis by the Watershed Manager. Woody material including stumps, snags, and branches create important fish and wildlife habitat and will be retained unless it threatens a structure, is creating bank erosion, impedes reasonable access or compromises flood protection to the community.

D. General Criteria for Sediment Removal

Sediment will be removed in unmodified creeks only as necessary to provide flood protection or to ensure proper operation of facilities including culverts, bridges and outfalls. Any sediment removal work in unmodified streams will have resource protection measures and best management practices identified and assigned to the work, the work will be reported to agencies in May each year prior to starting the work, site specific requirements and environmental constraints will be reviewed in a pre-work conference, the work will be examined and recommendations documented to improve the work during lessons learned and an evaluation of the resource protection measures provided to implement improved work methods. Each site will be reviewed by a biologist and appropriate site surveys conducted to minimize impacts to water quality, vegetation and native species. Spawning gravels will be restored, low flow fish passage will be maintained, and native aquatic vertebrates will be salvaged. Disturbed areas will be reseeded, trees will be replaced in accordance with the best management practices in the Stream Maintenance Program.

In addition, the Watershed Manager will review and approve each of these jobs, assuring the balance of community flood protection and environmental concerns.

E. Upland Vegetation Management

In upland areas, the District shall continue to meet its requirement to abate combustible weeds within its rights of way on unmodified streams prior to July 1 as required by local fire codes. Details of this activity follow in the next section. Herbicides, mechanical methods and hand removal will be used as the tools to meet this requirement. Use of herbicides shall be reduced relative to historical practices to the maximum practical extent and replaced with alternative methods as defined in this document.

Herbicides used in upland areas of unmodified streams shall be non residual, post emergence herbicides. No pre emergence herbicides will be used. Herbicides applied to target species on stream banks shall be registered for aquatic use.

In upland areas, herbicides shall only be applied to:

- Maintain vehicular access on existing maintenance roads. When such work is performed, herbicide use will be minimized by performing spot applications directly to existing weeds. No broadcast applications will be conducted in unmodified streams. See Reference Figure 1.
- Control non-native, invasive species. Herbicide use shall be minimized through the use of the cut

stump treatment method. This work is done to improve creek habitat by providing conditions for native vegetation to establish. See Reference Figure 2.

F. Upland Non chemical Weed Abatement

In areas inaccessible to vehicles, though herbicides could be used, the preferred method shall be non chemical in acknowledgment of the higher environmental values of these less disturbed areas. The requirement for control and removal of combustible weeds in these areas shall be met through the use of hand crews. Work in these areas shall not commence until the end of the rainy season (May 1) and shall be limited to providing adequate defensible space as required by the code through the removal of dry weeds and grasses only. No native shrubs or trees shall be removed through this process unless it is deemed by a fire code officer that such removal is required to comply to the code. By adhering to this practice, grasses are allowed to mature and produce seed for the following season while the fuel load is eliminated prior to the start of fire season. Areas to be cleared shall be surveyed prior to the commencement of work and active nesting areas shall be identified and avoided. Reference Figure 3.

G. In-stream Use of Herbicides

Herbicide use within the banks of a stream shall be limited to the use of aquatic registered herbicides on invasive non native plants within the District's right of way. See Revised Table 2-2, Herbicide Use for the Stream Maintenance Program and Appendix H, Pesticide Literature Review in the Stream Maintenance Program for additional details. Pesticides with an aquatic species hazards class will not be applied in currently occupied habitat or within 200 yards (air application) or 40 yards (ground application) of habitat.

Minimization of use of herbicides and avoidance of impacts to non target plants shall be ensured by limiting herbicide applications to the treatment of cut stumps of the target species.

No herbicide applications shall be made within 48 hours of expected rainfall to minimize movement of the product off of the treated area.

See Figure 4 for typical cross section and limits of work.

IV. Definitions

A. Definition of Unmodified Streams

An unmodified stream is defined for the purposes of this document as a creek, river, or section thereof, which has not undergone the process of construction of modifications to meet specific flood control criteria. Examples of such criteria would include design to pass specific flows, such as a 25-year flood, or the protection of a specific number of homes, businesses, schools, etc. Further, (1) reaches of unmodified streams which meet FEMA standards regarding flood insurance requirements (i.e. has been analyzed to have the capacity to contain the 100-year flood as inventoried in the District's Waterways Management Model) and (2) reaches of unmodified streams that are part of capital improvement projects under the Clean, Safe Creeks and Natural Flood Protection Program are excluded from these guidelines and will be maintained to an appropriate standard.

An unmodified stream may be in its natural state, or may have had minor modifications, such as small bank protection projects, grade control structures, or minor realignments from past uses such as agriculture.

B. Definition of Work Areas

Upland areas are defined for the purposes of this document as any areas above the stream bottom.

Specific areas for work activities in upland areas include

- Areas outside of the banks of the channel for terrestrial herbicide applications as shown in Figure 1, e.g. maintenance access roads.
- From the top of bank to halfway down the stream bank, as shown in Figure 2, for mechanical abatement of weeds for fire protection
- Areas requiring cleanup of debris, blockages and downed trees

In-stream areas are defined for the purposes of this document as the cross sectional area of a stream between toe of bank and toe of bank, as shown in the typical cross section in Figure 4. In-stream work activities include vegetation management, sediment removal, and cleanup of debris, blockages and downed trees.

Projected work areas are listed in the attached table, *"Project Work Areas for Maintenance Under Guidelines for Maintenance Activities in Unmodified Streams,"* and are further described in the Stream Maintenance Program document, Chapter 1, Paragraph B.

C. Definition of Vegetation Terms

Aquatic vegetation is that herbaceous vegetation that grows in the wetted channel bottom and is typically dependent on either sustained flow or prolonged periods of water on site for survival.

Herbaceous vegetation consists of flexible, non-woody vegetation which includes grasses, broadleaf weeds, cattails, tules and some shrubs.

Woody vegetation is characterized as live vegetation having a stiff trunk or branch structure that is inflexible and does not bend over in flows. Typical vegetation types include trees and some large shrubs. This vegetation may be removed if capacity is compromised or the vegetation is causing erosion to adjacent stream banks or structures.

Non-native vegetation is defined as vegetation that is not naturally found in riparian or wetland ecosystems. These species may be removed by the District because their invasive nature typically reduces native vegetation cover and degrades natural habitat. Species include giant reed, tree tobacco, castor bean, pampas grass, eucalyptus and acacia.